GAS JOURNAL

LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

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Editorial Notes.

Development Grants.

THE first meeting has already been held of the Advisory Committee under the Chairmanship of Sir Arthur Duckham, whose appointment was announced in last week's "JOURNAL." The Committee, it will be recalled, has been set up under the first part of the Development (Loan Guarantees and Grants) Bill to advise the Government on applications for assistance from public utility undertakings (transport or communication, gas, electricity, water, or power), except such as trade otherwise than for profit.

There has been drawn up by the Committee a form which should be followed by applicants in submitting particulars of schemes; and those who may contemplate taking advantage of the proposals should note that copies of the form may be obtained from the Secretary, Development (Public Utility) Advisory Committee, Treasury Chambers, Whitehall, S.W. 1. The form states that, in considering applications, whether for guarantees or grants, regard will be paid to (1) the extent to which the capital expenditure in question is calculated to promote employment in the United Kingdom, and (2) the probability of the scheme not being proceeded with in the near future if assistance is not given.

The Committee have been informed by Mr. J. H. Thomas that he has already discussed the subject with public utility undertakings, and that he is aware that there are many schemes on which these undertakings are not prepared to embark at the present time solely by the aid of their own resources, because they would not be immediately remunerative. With the idea of lessening unemployment, he is anxious that the putting in hand of such schemes should be accelerated, and he has expressed the hope that soon the Committee will be able to inform him that much useful work will be put in hand under the powers of this Bill before the coming winter. Should work carried out under these conditions become, as Mr. Thomas says, in a few years remunerative, and make for increased efficiency, this will satisfy one aspect of the matter; but if unfortunately the present condition of affairs should not be a passing phase, it is not easy to understand how unemployment can be permanently lessened merely by putting in hand now work which would otherwise have been carried out in a few years' time. Any effort, however, to solve this deadly difficulty is assured of the sympathetic consideration of those who may be in a position to assist it; and there will be placed to Mr. Thomas's credit the fact that he has made an effort. On every ground, from the least selfish down to the most selfish, it is incumbent upon the country to struggle unceasingly to rid itself of this Old Man of the Sea, unemployment.

Central Testing Laboratories.

ADOPTION of official certification of gas appliances is growing apace. Nearly a year ago we referred in these columns to the dedication ceremony of the American Gas Association's new testing laboratory at Cleveland, where all types of gas apparatus undergo rigorous examination, and if approved are badged with the "Blue Star"—the symbol of satisfactory performance and complete safety in use. To our mind such a symbol has great propaganda value; definitely it tickles the palate of the public. In Denmark and the Netherlands a somewhat similar plan is in operation, and the New South Wales Commercial Gas Association have a central testing laboratory, and stamp with a "Seal of Efficiency" all appliances which emerge successfully from the ordeal of stringent investigation. Now the Canadian Gas Association have established a Laboratory Approval Division which issues a "Seal of Approval." The latter is a five-pointed star in light blue, and bears the wording: "Complies with "national safety requirements; approved."

The French gas industry is of opinion that official certification not only constitutes one of the best forms of propaganda, but encourages co-operation between the engineering and the appliance manufacturing branches; and in France also a scheme of merit badging is being adopted. Our issue to-day gives the rules and part of the specifications laid down by the Association Technique; and these will be read with interest by our readers, whatever their views on the subject. The specifications cover, among other things, pressure conditions, products of combustion, safety devices, adequate flueways, proper rating, and sound construction.

Also in this issue of the "JOURNAL" will be found a report of the discussion which took place on July 25 on the paper which Mr. B. J. Bell, of the Cardiff Gas Light and Coke Company, read before the Wales and Monmouthshire District Institution of Gas Engineers and Managers on May 16. A general meeting was convened for the purpose of discussion, and to give members the opportunity of inspecting the finely equipped workshops and laboratories at the Bute Terrace Works. In the course of this discussion Mr. H. D. Madden spoke of the value of the work done in the laboratories of gas undertakings, and of the pressing need for localized effort. We entirely agree with him. Each individual gas undertaking has special and invaluable knowledge of the particular district conditions and of the needs and difficulties of consumers; and this knowledge gives direct aim to those in charge of the local laboratory. The function of a central laboratory, which cannot supersede local laboratories, is different; and there can be little question that its influence

in co-operation with the manufacturers of appliances would be greater. It would serve as a clearing-house for information which can only be gained locally; it would be able to arrive at the optimum working efficiency of appliances, which is different from "thermal efficiency;" and there appears no reason to suggest that it would act as a brake on the enthusiasm of the manufacturers. It would in essence be a national extension of the co-operative principle which is guiding the Gas Light and Coke Company in their work to improve the efficiency of industrial gas appliances, as described in the "Journal" a short time ago.

Coal Selling Schemes.

Recent coal trade news to hand has not been altogether reassuring, and, as was to be expected as a result of the situation after the general election, politics are once again intruding themselves to the exclusion of commercial and economic considerations. So far, the hours' question remains rather vague, and it is quite obvious that there is recognition in high places of the difficulties which would follow any sudden reduction in the working time. This is all to the good, and, though the Government evidently considers itself bound to do something in this respect, it appears to be walking warily in the matter.

It may be remembered that earlier in the year, when "selling schemes" were very much to the fore, the County of Durham had one under consideration. It was no secret at the time that it was at the instigation of the headquarters of the owners in London that the matter was pressed, or, in other words, that the several districts which had already schemes working were anxious for some kind of restriction in Durham. It is also no secret that Durham, seeing their trade and their prospects improving every day by natural means, did not look with favour on any such experiments, and, having toyed for some time with a draft scheme, they let the matter drop. Since then, the market has moved more favourably than for many years past; employment has increased; and the district as a whole has paid its way for the first time since the 1926 stoppage.

During the past week, following a conference of the Mining Association in London, the Durham selling scheme has been resurrected, and, at a meeting of the local Association in Newcastle, it has been adopted, and is to be prepared for putting into operation at a comparatively early date. This time it is no secret that it is under pressure from Government quarters that matters have been brought to a head. Until full particulars of the scheme are forthcoming, it is impossible to comment in any detail or attempt to forecast any effect, but the Durham coalfield is of such importance to the gas industry that we cannot let the occasion pass without some reference in these columns. For selling schemes, as they are called, have much in common with "rings and combines," and can only have as their ultimate object the raising of the price to the consumer. Unfortunately in the case of coal it is easier to make the home consumer pay up than the foreigner.

For the time being we must leave it at that, and merely add that it is most unfortunate for the coal trade, which includes both capital and labour, that the inevitable disturbing effect of political intervention and a tangle of uncertainties should intervene just when matters really appeared to be shaping for better times.

The Nation's Strength.

An article which appeared in these columns three weeks ago, under the title of "The Small Capitalist," contained an appeal for the safeguarding of the small investor, by taking advantage of appropriate occasions to warn him of the pitfalls that beset the unwary. This we hold to be both a duty and a sound business proposition for those whose greater opportunities have made them more versed in financial affairs. The first point is obvious, because it is always the duty of the strong to help the weak; and as for the second, the safeguarding of the small investor is a good business proposition because, as we see it, the broadening of the basis on which capitalism is built-up is the most effective answer that the country can make to the extremist doctrines of which from time to time so much is heard. To secure this broadening, it is not enough to make a man a capitalist. The responsibility remains of seeing that he continues to be one, and this can best be assured by frequent reiteration to him, as regards his investments, of the excellent slogan "Safety First." There are many good channels for investment, and our own industry offers one of the soundest. The return is in relation to the safety of one's capital, as is usually found to be the case; for it may be taken as a general principle that a promised large return involves a proportionately greater risk.

Co-partnership has been the means of creating a large army of modest capitalists, and the whole nation is debtor to a system which has provided so strong a bulwark against Socialism. But even beyond the ranks of co-partners, there is an ever-growing number of persons who are desirous of having a stake in the country; and they may advantageously have their attention drawn to the claims of the gas industry from the investors' point of view. There is no need here to indicate particular undertakings. Those in London and the Provinces vie with each other in excellence of administration and efficiency in working. It may, however, be pointed out that the stock of the largest Gas Company is quoted in units of £1 nominal value. We have been publishing in the "Journal" from time to time analyses of the accounts and financial position generally of various gas companies, a study of which will reveal a wide selection of opportunities for investment. Already a score of undertakings have been dealt with by us in this way; and it is to be hoped that the result has been to place a good deal of investment money—especially that of the small capitalist—in safe keeping.

We have said that a widespread system of capitalism is the surest antidote to Socialism. Yet, curiously enough, it is agreement with a statement by an advanced member of the new Government which has led us at the present juncture to return to this vital subject. Mr. Philip Snowden, the Chancellor of the Exchequer, speaking at a civic dinner at Bournemouth in connection with the National Savings Assembly, referred to the increase in the sale of savings certificates, and stated that one of the most remarkable things in connection with post-war events had been the extension of thrift among the working people in this country. One of the benefits which the National Savings Movement afforded, he went on to remark, was that it gave security to savings for people who could not afford to take any risk. He added a word of warning to thrifty people to be extremely careful about the investments they selected. "There were a great "many temptations to-day; and it had come to his "knowledge that working people were sometimes tempted "by the dazzling proposals of capital appreciation or "high rates of interest to invest in issues of shares that "were not of a very reputable character. He knew the "struggles that working people had to put a little by, "and it was a terribly painful thing to see the savings "of years, involving often hardship and sometimes suffer-"ing, swept away and entirely lost."

In these words, Mr. Snowden has put as well as could possibly be done the point of view which we have long been desirous of impressing upon those responsible for the administration of gas undertakings. The small capitalist will be, if he is not already, the backbone of the country; and nothing must be permitted to stand in the way of his development.

The Bar to Prosperity.

The need for saving was also pointed out by the Chancellor of the Exchequer, when speaking at the recent Bankers' Banquet at the Mansion House; but he was regarding the matter from a somewhat different angle. We are anxious for the preservation and the multiplication of the individual small capitalist; Mr. Snowden is all for economy, but it seems to be economy on the part of "the other fellow." Always it is the same thing. Whatever may be the case with charity, economy certainly cannot be said to begin at home. The Chancellor is afraid that

he can hold out very little hope of any reduction in the total of taxation in the ensuing year; for he cannot see where any considerable reduction of expenditure can be made, except in connection with armaments. In saying this, he admits his inability to remove what is undoubtedly a great bar to the return of prosperity to this country; but though he is himself unable to offer that example which is better than precept, he appeals to "the other fellow" —that is, to every section of the community—who, he declares, can help by saving, by avoiding wasteful expenditure and the ostentatious display of luxury.

We desire to see every man a capitalist, however small, so that he may have a recognizable stake in the country. Nevertheless, however it is regarded, saving must benefit both the country and the individual. The present is not a time—no period could be less so—for wasteful expenditure; but does Mr. Snowden realize how much he is asking when pressing for avoidance of "the ostentatious display of luxury?" It seems too much to hope for. Still, miracles in the way of economy might be performed, if only the community had a lead from the quarter whence it should come.

Prevention is Better than Cure.

For a long time it must have been obvious that everyone could not be a Samson of the music halls; yet only now is it being realized that not everyone can be a champion weight-lifter in a gas-works, and that it is most desirable to allot tasks to individuals on some basis more scientific than that of mere chance. The outcome of wise selection of labour is happier workmen and more efficient work; and we commend to our readers study of the plan which is being put into practice by the Wandsworth, Wimbledon, and Epsom District Gas Company, and which is explained in outline in later columns of our issue to-day. The idea is the simple one of re-distribution of labour following upon a medical inspection, the findings of which allow of reasonable allotment of tasks to those best fitted to accomplish them satisfactorily alike to themselves and their employers. The medical examination is absolutely private, and it is emphasized that there is no ground for fear that there will be any "sacking." If a workman is unfitted for the particular job in which he may be engaged, he is changed to a suitable occupation in which his health will be better and wherein he may reasonably hope for advancement.

We have no need to dwell upon the collateral advantages of such a scheme; they will at once spring to the mind of the reader. All such schemes, broadly planned and sympathetically directed, are destined finally to meet the full approval of the workers, however sceptical or timid they may be initially, for they will gradually recognize that neither happiness nor progress will mark their path if they are square pegs in round holes. Much—practically everything—must depend upon sympathetic direction, but the spirit of co-operation and goodwill is by no means alien to the administration of gas undertakings. Mutual help has characterized the internal organization of gas-works for many years, and, the feeling of trust having been established, the ground is fertile for further helpful effort.

The Wandsworth medical service, which came into operation in July, 1928, is, of course, but one method of enhancing the general well-being and sense of responsibility of the workers in our industry. The scheme is founded on the belief that "prevention is better than cure." Well over thirty years ago the South Metropolitan Gas Company, recognizing the value of this idea, instituted a jury system of accident investigation, and rapidly followed-up this democratic move by the inauguration of an Accident Fund which has the dual object of prevention and prompt and certain compensation. And then there is their exceedingly well organized welfare service, including the installation of an electro-cardiograph. Every man who enters the employment of the Company is medically examined. Also, every man who reaches the pensionable age is examined; and if no serious defect is found, he is allowed to carry on either at his own job or at work less strenuous. Briefly, he has the satisfaction—and this satisfaction has an extraordinary effect in promoting his happiness—of knowing that he is not "done." All schemes of this type demand effort and a certain monetary expenditure on the part of the administrators of gas undertakings; but there can be no question that the benefits, both tangible and intangible, are immensely great, and well worth while in every respect.

The Seventieth Milestone.

Whatever may be the truth with individuals, old age in the case of a technical publication is matter for congratulation; and we cordially extend our congratulations to our good friends of the "American Gas Journal." With the issue for July, that publication enters upon its seventy-first year of service on that side of the Atlantic similar to the service which we ourselves have rendered to the gas industry for an even longer period on this side. In each case, the record is a remarkable one. Founded on July 1, 1859, as the "American Gas Light Journal," our contemporary has witnessed, as we have done in this country, the rise of a gigantic industry. Reference to the first issue, in 1859, shows that even seventy years ago the future was to a considerable extent visualized; but who then could have realized to the full the extent of the service which gas was destined to render to humanity within so comparatively short a period? The "American Gas Journal," like its colleague the British "Gas Journal," is working in a good cause; and the satisfaction which this knowledge imparts we hope will continue to be accompanied by that material prosperity which is its due reward.

Dwindling Trades Union Membership.

The report of the Chief Registrar of Friendly Societies for 1928 shows that the number of trades unions on the register at the end of 1927 was two more, at 487, than at the close of the previous year; but the number of members had declined from 4,147,653 to 3,903,048. The funds at the beginning of 1927 were £8,468,611, as against £12,586,920 in 1926; and at the end of the year they were £9,709,538, compared wth £8,478,371 at the end of 1926.

Monotony in Work.

In the preface to the report of a preliminary inquiry into the effects of monotony in work, published by the Industrial Health Research Board, the opinion is expressed that the wholesale replacement of manual by mechanical methods of production, which has occurred over a long period in the past, and is still continuing vigorously, has tended to focus attention on the mental rather than the bodily effects of the work, and that as an influence in industrial life boredom is now rightly regarded as no less important than fatigue. As the result of a large number of observations, it appears that boredom causes a reduced rate of working, which is particularly noticeable about the middle of the spell. The decrease usually lasts from one to two hours; and during that time the average reduction in the rate of working varies from 5 to 10 p.ct., followed by a steadier and improved rate as the end of the spell is approached. Indications are that the amount of boredom is least when the work either is entirely automatic, so that the operator can think of other things, or where the attention is concentrated entirely on the work; but its extent appears to be largely a matter of individual characteristics and tendencies. Boredom is less liable to arise if the form of activity is changed at suitable times during the spell of work, if the operatives are allowed to work in compact social groups, or if suitable rests are introduced.

FORTHCOMING ENGAGEMENTS.

Aug. 13-14.—Irish Association of Gas Managers.—Meeting in Dublin.

Sept. 12.—North British Association of Gas Managers.—Annual Meeting at St. Andrews.

Sept. 19.—Wales and Monmouthshire District Institution of Gas Engineers.—General Meeting at Porthcawl.

Oct. 4.—Manchester District Institution of Gas Engineers.—General meeting.

Oct. 28-30.—British Commercial Gas Association.—Annual Conference at Eastbourne.

PERSONAL.

Mr. FRANK LAKE, B.Sc., of Newton Abbot, has been appointed a chemist in the London laboratories of Messrs. Radiation Ltd.

Councillor H. J. WATSON, a prominent member of the Chesterfield Gas Committee, has accepted the Town Council's invitation to be Mayor of the Borough for the ensuing year. He is a Director of the Bolsover Gas Company.

OBITUARY.

KARL AUER, RITTER VON WELSBACH, the inventor of the incandescent gas light, electric metal thread lamp, and other important technical advances, died on Aug. 5 at Schloss, Welsbach, Carinthia, at the age of 70. He was President of the Auergesellschaft, which has large chemical works at Treibach, and member of the Academies of Science of Vienna, Berlin, and Stockholm. Karl von Welsbach studied in Heidelberg under Bunsen, and his researches in the chemistry of rare minerals produced several results of scientific and technical importance. His invention of the incandescent mantle was made in 1885, and five years later a Company, the Auergesellschaft, which now has 4000 employees, was formed to manufacture the Welsbach patents. The invention by Karl von Welsbach of the osmium filament lamp followed in 1897, and six years later he invented the ferro-cerium compound used in pocket lighters. Many scientific bodies in his own country and abroad conferred their honours upon him, and he himself endowed a number of social and scientific institutions.

SOCIETY OF BRITISH GAS INDUSTRIES.

List of Prize Winners.

The following is a list of winners of the prizes given by the Society of British Gas Industries in the City and Guilds of London Institute's recent examinations in Gas-Works Practice, Gas Supply Practice, and Gas Fitting.

MINOR COURSE IN GAS-WORKS PRACTICE.

1st prize, £5 5s. Charles William Fox Illingworth.
Examined at Sheerness.

2nd prize, £2 2s. Ernest George Smith.
Examined at Bournemouth.

MINOR COURSE IN GAS SUPPLY PRACTICE.

1st prize, £5 5s. Arthur Howard White.
Examined at Tottenham.

2nd prize, £2 2s. Ralph Middlemore Hand.
Examined at East Ham.

FINAL EXAMINATION IN GAS FITTING.

1st prize, £5 5s. Harry Joseph Thirkettle.
Examined at Cambridge.

2nd prize, £2 2s. Harold William George McLaren.
Examined at Exeter.

ASSOCIATION OF PUBLIC LIGHTING ENGINEERS.

Programme of Annual Conference.

The following is the programme of the 6th Annual General Meeting and Conference of the Association of Public Lighting Engineers to be held in the Town Hall, Bournemouth, on Sept. 9 to 12, under the Presidency of Mr. JOHN F. COLQUHOUN, City Lighting Engineer, Sheffield.

Monday, Sept. 9.

7.30 p.m. Reception at Town Hall by His Worship the Mayor of Bournemouth, Alderman Charles Henry Cartwright, J.P., who will then declare open the Exhibition of Public Street Lighting Appliances.
Light refreshments and conversazione.

Tuesday, Sept. 10.

10.0 a.m. Opening of Conference in the Town Hall. The President (Mr. J. F. Colquhoun) in the chair.
Welcome to the Borough by His Worship the Mayor.
President's reply.
Introduction of new President (Mr. S. B. Langlands, J.P., Lighting Inspector, Glasgow).
Presentation of Diploma to retiring President.
Formal business. Minutes of last meeting.
Appointment of scrutineers for the election of Council and Officers for 1929-30.
President's Address.
Paper: "Lighting and Rating," by Ex-Bailie James MacDougall, Glasgow.
Discussion thereon.

1.0 p.m. Adjournment for luncheon at the kind invitation of the Chairman (Mr. Wm. Cash, J.P., F.C.A.), and Directors of the Bournemouth Gas and Water Company in the Town Hall (presided over by Lieut.-Col. Sir Charles L. Morgan, C.B.E., Past President, Institution of Civil Engineers, Deputy Chairman of the Company).

2.30 p.m. Reassemble at Town Hall.
Paper: "Compromise in the use of Illuminants for Public Lighting," by C. H. Woodward, Lighting Superintendent, Bournemouth.
Discussion thereon.

Wednesday, Sept. 11.

9.30 a.m. The President, with Council and members, will place a wreath upon the Borough War Memorial.

10.0 a.m. Assemble at Town Hall.
Joint Paper: "American Practice in Public Lighting," by J. F. Colquhoun, City Lighting Engineer, Sheffield, and E. J. Stewart, M.A., B.Sc., Assistant Inspector of Lighting, Glasgow.
Discussion thereon.
Paper: "Private Lighting as a Supplement to Public Lighting," by J. S. Dow, Secretary, Illuminating Engineering Society.
Discussion thereon.
Report of scrutineers.
Other general business.
Place of meeting for 1930.

1.0 p.m. Members and delegates will make their own arrangements regarding luncheon.

2.30 p.m. Reassemble at Town Hall for inspection of Exhibition of Public Lighting Appliances.

7.0 p.m. The Association dinner in the Town Hall.

Thursday, Sept. 12.

Excursions by sea to Isle of Wight, Swanage, Southampton, &c.
Motor coaches to New Forest, Corfe Castle, Wimborne, Cheddar Gorge, Winchester, &c., as may be arranged by the members.

Members and Delegates requiring advance copies of Papers to be read should apply to the Secretary, Mr. W. J. Liberty.

ON THE ELECTRICAL SIDE.

Fittings by Instalments.

There is so much that is expensive about electrical equipment that "Fittings by Instalments" is a cry likely to make a wide appeal among both present and prospective users of current. This is clearly the opinion of the Directors of the United Dominions Trust, who announce that, in view of the developments in connection with the use of electric power throughout Great Britain, they have for some time been actively considering special plans for extending the services of the Company to cover the distribution under long-term credits of all kinds of electrical equipment for domestic or industrial purposes. They have decided that the best way to attain this object is by the formation of a subsidiary; and a Company is now being registered with a capital of £250,000.

Hire Purchase or Payment by Instalments.

The difference between hire-purchase and instalment payment purchase may not be at once obvious; but it has been thus clearly stated by Mr. R. Hardie, Superintendent of the Glasgow Corporation Electricity Showrooms: In the former, it is clearly laid down in the agreement that the monthly or quarterly payments are only payments for hire; the goods remaining the property of the seller until all instalments have been paid. Failing regular payment, the seller can recover possession. Under the instalment system of purchase, however, the property in the goods passes at once to the buyer, who actually owns the goods, although payment is spread over an arranged period. If default is made in payment, the seller cannot recover possession of the goods, but can only sue for the balance.

The Sorrows of Lakeland.

Mention has been made here on more than one occasion of the distaste of Keswick for disfiguring steel lattice towers over the countryside, in the supposed interest of cheap electricity. The Urban District Council have now decided, with one dissentient, to ask for an inquiry into the matter. Strong opposition is also being offered to the proposal of the Trent Valley and High Peak Electricity Company to erect overhead cables in certain parts of the Peak District. At a local inquiry the representative of the Derbyshire County Council declared that if he lived in the area in question he would not take the current from overhead cables. This will be the view of many people; and if a sufficient number act upon it, some means may be found of avoiding the most flagrant instances of disregard for the amenities of the countryside. Even though the cost may be less

than that of underground cables, there are cases in which cheapness may be too dearly bought.

Factory Lighting Campaign.

During the autumn of last year, an educational factory lighting campaign was planned by the "E.L.M.A." Lighting Service Bureau, and conducted by the Electrical Development Association; and from the results which have lately been published, it appears that 96 towns co-operated. Over 70 addresses were delivered to the electrical trade, and 120 lecture-demonstrations were given to industrialists. In one instance, advantage was taken of an engineering exhibition to organize a factory lighting exhibit and an information bureau. Over 100,000 postal communications were mailed direct to factories and workshops, while 112 advertisements appeared in various trade journals during the period of the campaign. More than 2400 inquiries were received as a result of this publicity, and followed up by propaganda material or a personal call. The accounts of the campaign show a balance in hand at May 21 of £1015; and nearly the whole of this amount is to be expended on a further booklet dealing with factory lighting, which will contain reproductions of photographs of good industrial lighting in modern factories.

Supply of Rural Areas.

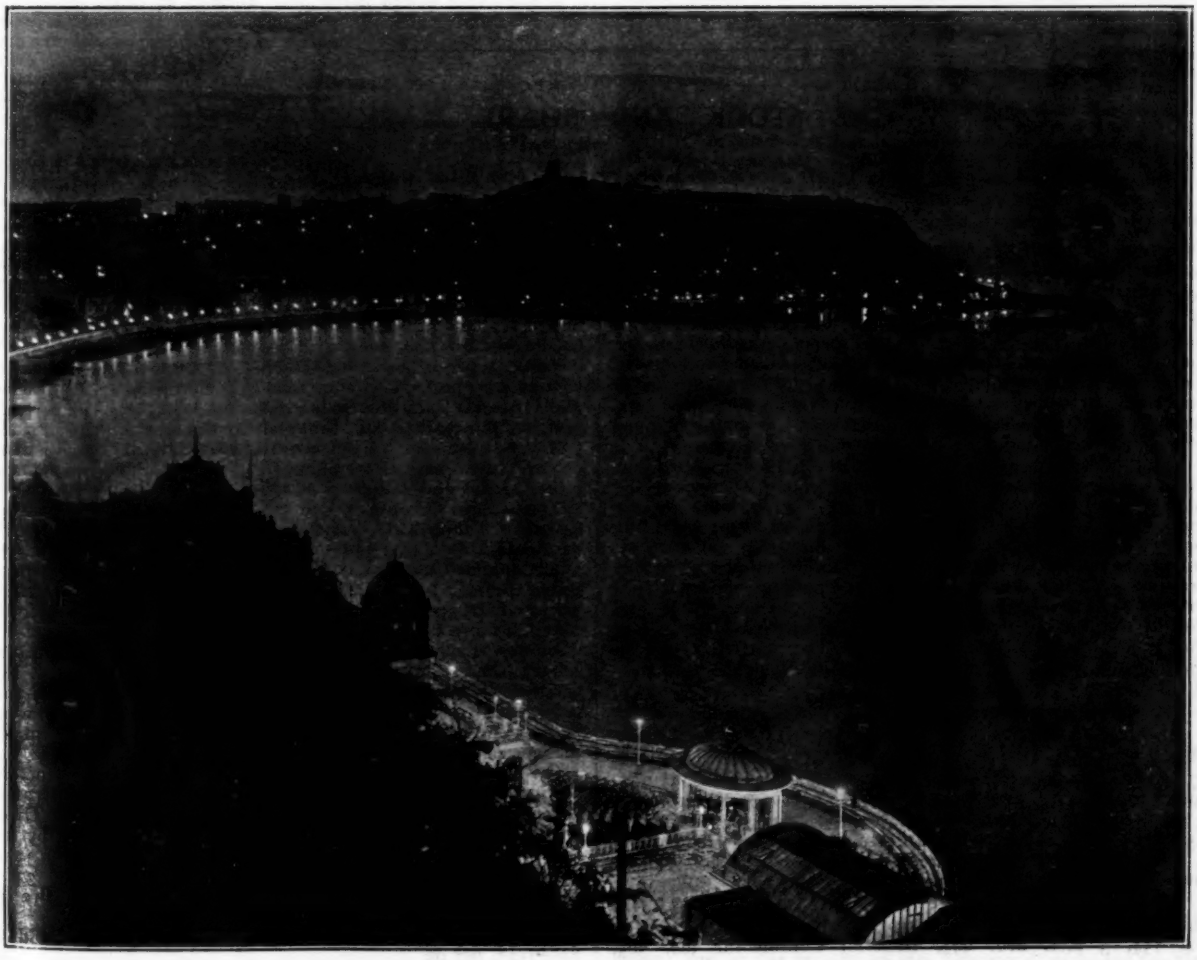
Towards the end of last year, Mr. W. W. Townsend, of Colchester, read a paper before the Southern Association of Gas Engineers and Managers, in which he considered the problem of the small works from the points of view of isolation and fusion, and the bearing upon the industry of electrical competition. Accompanying the invasion of the "Steel lattice tower," designed to carry the overhead cables, there has been optimistic talk and to spare of the coming of cheap electricity to the rural areas. What it will all amount to, nobody yet knows; but a reasoned view was quoted by Mr. Townsend from the report of the proceedings of the conference on electricity supply in rural areas, which was convened by the Electricity Commissioners. The quotation was "that the prospects in the sparsest and most remote areas are of such a low order as to preclude, or at any rate delay, for many years to come, the establishment of a public supply on a remunerative basis. It has been variously estimated that up to 50 p.ct. of the more sparsely populated rural portions of the country is likely to fall within this category." This is just about what one would have expected; and the statement was supported by facts which Mr. Townsend was able to submit with regard to an actual scheme of electricity supply for a rural area.

The Case of Hereford.

In the year 1921, the City of Hereford Electricity Department, having surplus generating plant at their disposal, embarked on a scheme of supply to a large rural area surrounding the city; and the accounts for the outside areas having been kept separate, Mr. Townsend was able to show that up to March, 1928, there had been a total excess of expenditure over income in connection with the rural supply scheme of over £37,000. It was perfectly fair to infer from this that the rural scheme has been a drag upon the city finances, and that the price of electricity to the citizens has been necessarily maintained at a high figure in order to make good the loss incurred by the rural scheme. Now we have the sequel. The Hereford City Council have decided to transfer the whole of their electrical undertaking to the Shropshire, West Midland, and Staffordshire Power Company—stated to be under American control. They are to be congratulated upon having found a purchaser.

SCARBOROUGH BY NIGHT.

Splendid Example of Gas Lighting.



The above photograph, which was published recently in "The Times," is of the South Bay of Scarborough, showing the famous Spa in the foreground. The photograph was taken about midnight; and practically every light visible is a gas lamp. All the public lighting in the "Queen of Watering Places" is by gas.

GLIMPSES INTO THE PAST.

From the "JOURNAL" Eighty Years Ago.

Steaming in Vertical Retorts.

In a patent granted in 1839 to Mr. E. O. Manby, we find the germ of Mr. White's patent of Sept. 26, but with this difference, that Mr. Manby proposed to use steam generated in an independent boiler, and raised to a high temperature before being admitted into the decomposing retort; whereas Mr. White prefers to make use of water, which is converted into steam, and then decomposed in the same vessel. Of the superiority of the process of 1839 over that of 1849 there cannot be two opinions.

Mr. Manby claims generally "the manufacturing of gas for the purpose of illumination, by passing steam into a retort or closed vessel containing anthracite, or stove coal, or culm, charcoal, coke, or bituminous coal, heated to the temperature described in the specification." The apparatus in which this can be effected is described thus:

A cylindrical retort about 8 in. or 10 in. in diameter, placed vertically and with its lower end curved outwards to facilitate the discharge of its contents; this end is furnished with a lid or cover fitted in the usual way in which covers are fitted to gas retorts. The steam is supplied to each retort from a boiler by means of one main pipe, from which smaller pipes lead to each retort. This smaller pipe becomes heated to a considerable temperature. This pipe is furnished with a cock or valve, whence it enters the retort at the lower extremity through the admission pipe. The retort is just heated to a lively red heat the same as the distillation of gas from coals, then quickly charged with the materials to be used for producing gas; and the heat is continued the same during the operation as is usual with retorts in the common manufacture of gas. Some minutes after the retort is charged and closed the steam is let in.

It is to be regretted that the system above described should have found no patron to give it a fair trial; for, though it has had many imitators, we doubt whether any of them have improved upon it, and some of them are mere plagiarists. There can be no question that it offers a large field, rich in future discoveries to a sagacious and intelligent explorer, and as yet but little trodden.

Who Invented the Gas Meter?

It might be regretted if the age which produced a machine so ingeniously contrived and so useful to society as the gas meter should pass away without some attempt being made to trace the rise and progress of the invention—what share *each* mind had in its advancement—and how far the principles of previously existing machinery were applied in its formation.

The first gas meter was constructed by Samuel Clegg, about the year 1815, and to him has been conceded the honourable appellation of *inventor of the gas meter*. The name *inventor*, however, in this case, as well as most others, is received in too wide a sense; for it may be safely asserted that no man ever *completed* any invention. Savery did but improve on Hero of Alexandria, Newcomen on Savery, and Watt on Newcomen, to produce the steam engine; and so we shall find, on inquiry into this subject, that Clegg borrowed from the clepsydræ of the ancients, Malam from Archimedes and Clegg, and Crosley and others from Malam, to produce the present gas meter. The title of *inventor* is applied to him who has done *most* towards the progress of a machine; in some cases (like that of Watt) to him who brings it to perfection; in others (like that of Clegg) to the originator; and too frequently to the exclusion of men equally ingenious.

The question as to who was the *true* inventor of the gas meter has been argued in our learned societies, with bitter and angry feelings. Lawyers have pleaded, and judges adjudicated on the subject, and it would be indiscreet to resuscitate animosities long since sunk into oblivion, or look upon the subject with a party bias. Time has now mellowed asperities. The grave has closed over some of those most deeply interested, and a new generation has sprung into existence, impartial observers of the past and admirers equally of the great talents of the men at one time placed in antagonism.

GAS STOCK AND SHARE MARKET.

[For Stock and Share List, see later page.]

NOTWITHSTANDING the holiday atmosphere and the uncertainty regarding the future of money rates, there was distinctly more business done on the Stock Exchange last week. Bargain hunters have been picking up those securities which have been unduly hit by the depression, and brokers are much more cheerful with regard to future prospects. There were, of course, disappointing features, and gilt-edged and other purely "money" stocks continued to be subdued by the doubts as to the Bank Rate. Foreign bonds were also somewhat depressed, and Home Rails failed to broaden out in the manner which promised on the interim dividend announcements.

It will be seen from the Table of stock and share values that there was, with one exception, no improvement in prices in the Gas Market, but transactions were up to expectation for the time of the year. The exception was the Gas Light and Coke Company's £1 unit, which advanced 3d. to 18s. 9d.-19s. 3d. Imperial Continental dropped another 10 points, and Primitiva ordinary 6d.; but otherwise there was nothing of importance to record. Commercial ordinary stands at a low figure, and during the week purchases were made at below the lowest quotation, which is very exceptional. Uxbridge 5 p.ct. ordinary is also worthy of notice at 93-98, the yield being attractive.

The following transactions were recorded during the week:

MONDAY.—Barnet 7 p.ct. max. 114⅜, 115¼, Bombay 19s., British 7 p.ct. pref. 117, 5 p.ct. deb. 96¼, 96½, European 16½, 17½, Gas Light and Coke 18s. 7½d., 18s. 9d., 18s. 10½d., 3½ p.ct. max. 61⅜, 62½, 4 p.ct. pref. 74½, 74½, 75½, 3 p.ct. deb. 57½, 5 p.ct. deb. 99½, Imperial Continental 360, 363, Primitiva 35s. 3d., 36s., South Suburban 5 p.ct. deb. 96, Wandsworth 5 p.ct. pref. 92. Supplementary prices, Hartlepool 5 p.ct. max. 82, Uxbridge 4 p.ct. deb. 73.

TUESDAY.—Bournemouth 5 p.ct. 13½, European 16⅜, Gas Light and Coke 18s. 7½d., 18s. 9⅜d., 18s. 10½d., 4 p.ct. pref. 74, 75½, 5 p.ct. deb. 99½, Imperial Continental 360, 365, Primitiva 4 p.ct. con. deb. 81, 82, South Metropolitan 102⅞, 103, Tottenham 3½ p.ct. 107½, Tuscan 36s. 3d. Supplementary prices, Liverpool 5 p.ct. 94, 94½, 95½, Northampton 5 p.ct. 78.

WEDNESDAY.—British 119½, Cape Town 4½ p.ct. pref. 7, European 16⅜, 16½, 16¾, Gas Light and Coke 18s. 6d., 18s. 6¾d., 18s. 7½d., 18s. 10½d., 3½ p.ct. 62, 4 p.ct. pref. 74½, 3 p.ct. deb. 57½, 57¾, Imperial Continental 361, 363, 365, Liverpool 7 p.ct. pref. 102, Primitiva 35s. 3d., 35s. 6d., South Metropolitan 102⅞, 3 p.ct. deb. 58½, Tuscan 40s., Uxbridge 5 p.ct. pref. 91. Supplementary prices, Associated Gas and Electric "A" $65, 66, Farnham 6 p.ct. pref. £10 16s. 9d.

THURSDAY.—Alliance and Dublin 90, Cape Town and District 4½ p.ct. pref. 7⅛, Commercial 94½, European 17, Gas Light and Coke 18s. 9d., 18s. 10½d., 19s., 19s. 1½d., 19s. 3d., 4 p.ct. pref. 74, 5 p.ct. deb. 99¾, Imperial Continental 360, 362, Primitiva 34s., 35s., 35s. 3d., South Metropolitan 102¼, South Suburban 5 p.ct. 105½, Tottenham 3½ p.ct. 107½. Supplementary prices, Grays and Tilbury 7 p.ct. 11½, 4 p.ct. deb. 75.

FRIDAY.—British 4 p.ct. deb. 73, 5 p.ct. 96¼, Commercial 94, Croydon sliding-scale 112, Gas Light and Coke 18s. 9d., 18s. 10½d., 19s., 19s. 1½d., 3½ p.ct. max. 61½, 3 p.ct. deb. 57, 57½, Imperial Continental 360, 362, 363, Primitiva 35s., 4 p.ct. con. deb. 81½, 82, 4 p.ct. deb. (1911) 81½, 82. Supplementary prices, Hartlepool 5 p.ct. 82½, Horley 10 p.ct. 120, North Middlesex 5 p.ct. pref. 90, 90½.

In the Money Market the outflow of gold to Paris was the principal feature during the week. Loan rates were firm, but eased down on Friday; old loans being renewed at 4 p.ct., and new loans obtainable down to 3½ p.ct. Discount rates were perhaps slightly easier, but Treasury Bills were allotted at an average of 1d. p.ct. higher at £5 9s. 2·83d. p.ct.

On the Foreign Exchange Market, the most satisfactory feature was a late rise in both the New York and Paris rates, the former closing at 4.85$\frac{7}{16}$, and the latter at 123.85. There was also a slight movement in favour of Sterling shown by the Amsterdam rate, which rose to 12.11. The Belgian and Spanish exchanges were slightly higher at 34.90½ and 33.21 respectively. German marks at 20.36¼, and Italian lire at 92.80, were unchanged.

Silver was quoted at 24$\frac{5}{16}$d. per oz. for cash, and Gold at 84s. 11½d. per oz.

The Bank Rate is 5½ p.ct., to which it was raised from 4½ p.ct. on Feb. 7. The Banks' deposit rate is 3½ p.ct., and the deposit rates of the Discount Houses are 3½ p.ct. at call and 3¾ p.ct. at notice.

WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.

Special General Meeting at the Cardiff Gas Company's Offices.

There was a good attendance of members at the special general meeting of the Wales and Monmouthshire District Institution of Gas Engineers and Managers held at the Offices of the Cardiff Gas Light and Coke Company, Bute Terrace, Cardiff, on Thursday, July 25.

The meeting was convened to discuss a paper read at the annual meeting of the Institution last May, and which was published in the "JOURNAL" for May 22, entitled "Appliances and Service," by Mr. B. J. Bell. There was a consensus of opinion that the paper was so interesting as to merit special consideration. Prior to the discussion the members made a tour of inspection of the new cooker and meter repair shops, the laboratory, &c., and they were later in the afternoon entertained at tea by the Chairman and Directors of the Cardiff Gas Light and Coke Company.

They were taken round the works by Mr. H. D. Madden, Mr. Bell, Mr. Frank Boardman, Mr. R. J. Auckland, Mr. W. T. Lane, and Mr. A. C. Prankere (the works' foreman), who described the various new equipments.

It was explained to the visitors that the old method of cleaning cookers did not give the desired results, and Mr. Bell and his associates therefore looked around for a better means, and finally adopted the steam chest method. Instead of burning out the accumulated dirt, this is now done by a steaming process which has been found more effective and economical. The apparatus consists of a cast-iron base with an inlet for steam in the centre. The cooker is placed over the steam pipes, the hood is lowered, and the steam is allowed to circulate through every part of the cooker. After a short time the hood is taken up for a few minutes and the cooker coated with 50 p.ct. solution of caustic soda. It is then allowed to remain in the steam for about 20 minutes, and when finally taken out it is washed down. It is then in a perfectly clean condition. This scheme, it was pointed out, is particularly applicable to cookers with enamelled linings.

Recently a spraying system was adopted for painting meters and cookers, and eventually it is proposed to instal a japanning oven for the treatment of cookers. One of the spraying appliances is reserved for meters, and the other for cookers. The compressor plant was supplied by the Aerograph Company, and a dynamo has been installed for driving the ventilating fans. The shop is fully equipped with the necessary bending, buffing, and drilling machines.

The Company undertake to repair the whole of the meters, and the repairing shop is equipped for an output of 10,000 meters per annum. A test bench is provided; and it has been found necessary to have a special bench for testing the shutting-off of automatic valves. All scrap solder is salved, and most of the soft metal parts required in the meters are cast in dies which have been made in the shop.

On their way to the laboratory the party were shown the stores, which are situated on the site of the old retort house. It has recently been found necessary to make considerable extensions to the stores, and a building has been added with a covered loading platform. In this way lorries delivering material are easily handled, and much less labour is required.

In the physical laboratory the visitors were shown the equipment which has been provided for the satisfaction of customers in the direction of testing new appliances and investigating any complaints arising from the use of apparatus in consumers' premises. A small hot water apparatus which can be used in conjunction with the existing cylinder is being carefully observed. A bar photometer is fitted for the investigation of the behaviour of burners, and a thermopile is fitted for determining the radiation from gas fires. All the appliances supplied by the Company are subject to very careful investigation.

Mr. FRANK BOARDMAN, the President, occupied the chair at the subsequent proceedings.

After the adoption of the minutes of the previous meeting, Mr. J. H. Canning (Newport) was elected as a student.

APPLIANCES AND SERVICE.

Discussion.

Mr. BELL, in opening the discussion, gave an outline of the paper which he had presented at the annual meeting. He had, he said, dealt with the question of the private ownership of appliances, and he referred to the fact that laboratory perfection did not necessarily ensure district satisfaction. Hotplate construction and oven ventilation still remained problems needing solution. Many so-called improvements were not new at all, but were the adaptation of old methods. He reiterated the view that it would be advantageous for gas undertakings to engage women to instruct the housewife in regard to the best way of utilizing appliances.

Mr. J. H. CANNING (Newport) said that the paper read by Mr. Bell was well worthy of the extra time devoted to its discussion. The first point that occurred to him was the question of the ring burner as against what might be termed the modern burner. His experience was that they had to discard the latter and revert to the ring burner. However excellently a burner might be constructed, if it did not meet with the woman's view, the sooner it was dropped the better. Mr. Canning referred to the advantage of selling rather than hiring apparatus. When an apparatus was sold, more care, he said, was taken of it, and it was used more. Unfortunately in this connection they had to reckon with the competition of the electrical people. At Newport the latter were prepared to put in cookers free of charge. The sales of gas apparatus at Newport, however, were going up steadily, and they were finding a very good demand for the enamelled type of cooker—in fact, this was the only kind of cooker in demand. One of the most important and useful points raised in Mr. Bell's paper had reference to the provision of apparatus for water heating. The electrical people were giving special attention to this matter. There was a small compact heater which could be attached to the tank. In regard to lighting, he maintained that no greater mistake could be made than to assume that gas lighting had no chance of competing against electricity. As a result of a canvass made some time ago, they had been able to get back customers for lighting. If a real fight was made, he was confident that the gas undertaking would succeed in retaining a good deal of the present clientele.

Mr. W. H. JOHNS (Swansea) remarked that the methods adopted by the Cardiff Gas Company would be of great benefit to the Company with which he was associated. The testing of meters *in situ* in Swansea, continued Mr. Johns, had not proved such a success as appeared to have been the case at Newport. They had often found that the testing of meters *in situ* and on the bench did not give the same result. He would like a little more enlightenment in regard to the methods adopted in testing meters at Cardiff. Customers sometimes objected to the use of their own gas in testing meters *in situ*, though it was pointed out to them that the amount involved was very small.

Mr. CANNING observed that he did not suggest that the testing of meters *in situ* should supersede the bench tests at reasonable periods. The former should be supplementary to the bench test.

Mr. J. E. KENSHOLE (Aberdare) said that, in regard to water heating appliances, those in the colliery districts were entirely differently situated from those in Cardiff, Newport, or Swansea. The majority of the men connected with the collieries got their coal at very low rates, and many obtained it free. They could not expect these people therefore, to use gas apparatus, however cheap the latter might be. He thought bench meter testing was not so satisfactory as testing in the district. He doubted, however, whether the district testing was quite as accurate. He was very much impressed with the apparatus for the cleaning of cookers in Cardiff, but it would hardly pay in his district, where the majority of the appliances belonged to the consumers.

Mr. MADDEN thought there was some confusion regarding the question of the testing of meters. They had to discover meters passing unregistered gas, and in Cardiff they had a method which Mr. Bell could explain to them. When meters were tested on the spot by means of this method, customers were satisfied with the accuracy of the demonstration. In regard to the value of individual research he had noticed comments made in a technical journal, but he was not quite sure whether what was meant was a benediction or a criticism of what they were doing at Cardiff. They all, he said, believed in a national institution, and one could not praise too highly the value of the work done by Dr. Hartley, and the advancement made thereby. At the same time, no criticism could affect the utility of individual research locally. Pure academical research in a laboratory which was not in touch with the consumer might get down to scientific perfection, but the advantage of physical laboratories attached to the different gas companies was that the technical officers in charge of them were able to tackle local problems and to talk to consumers directly, and find out exactly the latter's point of view. This was why he supported the idea that physical laboratories should be attached to every gas company; and as a case in point he instanced the value of the research work done by Mr. Bell at Cardiff. The ideal was co-ordination between the central authority and the local laboratories. He agreed with Mr. Canning as to the greater use of enamelled apparatus. Not only did this apply to cookers but also to boilers, as customers appreciated the saving in labour involved by the use of enamelled goods.

Mr. J. STEPHENSON remarked that his experience was that they found greater difficulty in testing slot meters than ordinary meters.

Mr. BELL, in replying to the points raised, after remarking that discrepancies, where the meters were slow, had to be found out by the gas undertaking, exhibited a service which had been in use in Cardiff for detecting defective meters *in situ*.

Mr. KENSHOLE: The majority of meters are 3, 4, or 5 p.ct. slow.

Mr. BELL: I agree with Mr. Kenshole, but my point is that, if you avoid changing meters, you are saving money.

On the motion of Mr. B. GRANGE, seconded by Mr. J. STEPHENSON, Mr. Bell was cordially thanked for his valuable paper; and on the motion of Mr. KENSHOLE, seconded by Mr. COLLINS, a cordial vote of thanks was accorded the Cardiff Gas Light and Coke Company for their hospitality, it being remarked that the Company and the officials were always ready to help other workers in the industry.

THE CARBON MONOXIDE QUESTION.

By Dr. HARALD KEMMER, of Berlin.

This was the title of a paper read at the recent meeting of the German Gas Association by Dr. Harald Kemmer, of the Berlin Municipal Gas Undertaking. In view of the publicity which has been given to the subject by the recent announcement of a forthcoming official inquiry in this country, the publication of the text of the paper in "Das Gas- und Wasserfach" for July 27 is especially welcome, and the views of the German gas industry, as set out in the following abstract translation, will doubtless be of interest.

A short while ago there were repeated assertions in the daily Press of Berlin that experiments on a large scale were in progress with a view to removing the carbon monoxide from the town's gas, and so rendering it "non-poisonous and free from danger." Unfortunately these reports were rather ahead of facts, and served merely to disturb public opinion and provide ammunition for certain interested parties who are ever ready to discredit gas. The picture is always further adorned by numerous newspaper reports of gas poisoning cases, which as often as not are attributable to quite other causes than the town gas supply. Naturally there are instances where this is responsible, usually through careless or incompetent handling of gas apparatus. But no one advocates the abolition of motor vehicles because of the accidents which are due to them; and as for suicides, it can well be argued that, if gas is not available, they will readily find other means. But, when all is said and done, the following table, compiled from official statistics for 1927 of the City of Berlin and the State of Prussia, reveal how comparatively insignificant is the part played by gas in the total of deaths from other than natural causes.

TABLE I.

—	Berlin.	Prussia.
A—Fatal accidents :		
1. Traffic—		
(Rail and tramways, motors, motor and pedal cycles, aircraft) . .	570	4672
2. Other violent deaths	446	3224
3. From town gas	122	327
4. Other causes—		
(Burning, poisoning, shooting, drowning, electric shock, &c.) .	473	7686
B—Suicides :		
1. (*a*) Hanging	436	3874
(*b*) Drowning	225	1466
(*c*) Shooting	285	1668
Total	946	7008
2. Gas	589	1171

From these figures it is fair to deduce that the risk of gas poisoning, in spite of every effort in certain directions to emphasize it, is insignificant, and particularly so when the ubiquity of gas supply is taken into account, and its national importance in (1) smoke abatement; (2) general hygiene; and (3) the rational use of available coal supplies. Notwithstanding the obvious justice of this claim, the German Gas Association has considered it its duty in recent times to appoint a Special Commission to inquire into the subject. A report is required as to the possibility, from the present standpoint of theory and practice, of removing the carbon monoxide from gas to such an extent as to render its use free from any risk of poisoning, and whether the necessary basic changes in gas manufacturing processes could be visualized as technically and commercially practicable. The present paper is a summary of the preliminary investigations.

The author is unable at this stage to make any precise scientific declaration that any one particular process, based upon working costs, stands out before any other. He can only try to indicate certain lines upon which it appears the direct handling of the important problem should be started. For its solution upon the lines suggested in the accompanying diagram, to which further reference is made later, several processes would seem to come into question, which may be divided into three main groups:

(1) Absorption processes.
(2) Catalytic or so-called contact processes.
(3) Low-temperature cooling.

ABSORPTION—THE TECHNICAL ASPECT.

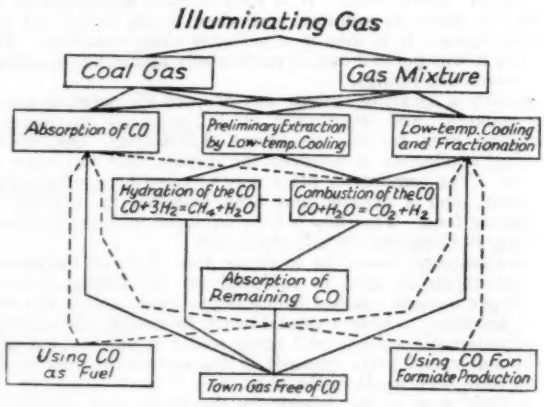
Of these three, absorption appears at first sight to be the simplest and readiest to hand, when superficially considered in the light of the ease with which ammonia, naphthalene, and benzole are extracted from gas in washers and scrubbers by means of a suitable solvent. For the absorption of carbon monoxide, two alternative solvents mainly suggest themselves:

(1) Ammoniacal copper chlorate or formate solution.
(2) Caustic soda.

The absorption of carbon monoxide by means of a copper chlorate solution takes place according to the well-known gas analysis principle, by which the copper chlorate forms an unstable combination with the carbon monoxide thus:

$$Cu_2Cl_2 + 2\,CO = Cu_2Cl_2,\ 2\,CO.$$

When heated in a vacuum, this combination is again dissociated, with simultaneous regeneration of the copper chlorate. In practice, however, the process is attended with considerable difficulties, as, owing to the instability of the resultant combination, pressures as high as 100 atm. are required for the complete absorption of the carbon monoxide, and the metallic parts of the apparatus are attacked by the solution; though the latter trouble is eliminated by the use of an ammoniacal solution. The principle is employed on a large scale by the Badische Anilin und Soda Fabrik, to remove traces, amounting to 1 or 2 p.ct., of carbon monoxide from the nitrogen-hydrogen mixture used for the synthesis of ammonia. They compress the gas mixture up to 200 atm., after it has been freed at an earlier stage by compressed water at 27 atm. from the carbon dioxide formed by carbon monoxide combustion with water vapour. To particularize, the carbon monoxide is washed out in scrubber towers filled with Raschig rings by the solution under a pressure of 200 atm. The Badische firm works at this high pressure because it is in any case required for the ammonia synthesis, though probably a lower pressure would suffice for the process in connection with town gas. The resultant solution is then relieved of pressure, and regenerated in special plant by heating under vacuum. For the absorption of some 16,000 cub.m. which must here be taken into consideration as the carbon monoxide contained in 100,000 cub.m. of gas mixture, some 1000 cub.m. of copper formate solution would be required, of which about 0·3 p.ct. would have to be replaced each day.



AN ESTIMATE OF COSTS.

Only a very rough estimate of costs can be made. The outlay for a daily make of 100,000 cub.m. [say, 3½ million c.ft.] of gas might be somewhat as follows:

	£
Total outlay on plant	50,000
Initial cost of copper salt	25,000
Total capital cost	£75,000
	£
Daily working costs—	
20 p.ct. interest and amortization	41
Replacement of salt	50
Working costs	100
Total daily revenue charges . . .	£191
	d.
Per 1000 c.ft.—	
Daily cost as above	12·99
11 p.ct. loss of energy in gas	1·39
	14·38
Deduct value of CO recoverable	1·09
Total cost per 1000 c.ft. gas treated .	13·29d.

From these figures it is clear that the removal of carbon

monoxide by this process would be so expensive that it cannot be treated as a practical proposition.

EFFECT UPON THE PROPERTIES OF GAS.

Apart from the technical and economic aspects dealt with above, consideration must also be given to the effect of carbon monoxide extraction upon the properties of the gas, such as its analysis, calorific value, density, and flame velocity. In the event of any material alteration in these factors, practically every consumer's apparatus would require reconstruction or replacement, and this would give rise to insurmountable difficulties. So that it may be said that any move towards rendering gas non-poisonous must be accompanied by a condition that there is very little or no alteration in its combustion properties. The effect which the removal of carbon dioxide and carbon monoxide would have upon two town gases—a mixture and a straight coal gas—is shown in Tables 2 and 3. In the case of the mixture (Table 2) which has a gross calorific value of 4290 k.cal. per cub.m. [480 B.Th.U. per c.ft.] and a density of 0·48, the calorific value would be raised to 4740 k.cal. [530 B.Th.U.] and the density reduced to 0·334. The loss of energy would amount to some 11 p.ct. This gas would certainly not be unsuitable to supply, and in any case, with an addition of some 10 p.ct. of inerts, it could be made to resemble very closely the original gas, with the same calorific of 4290 k.cal., and a density of 0·41.

TABLE 2.—*Influence of CO and CO_2 Extraction upon Gas Properties.*

Original Gas.	After Extraction of CO and CO_2.	With Subsequent Addition of 10 P.Ct. Inerts.
CO_2 = 4·0	..	2·0
C_mH_n = 2·5	3·1	2·8
CO = 15·5	..	..
H_2 = 50·0	62·1	56·2
CH_4 = 18·0	22·4	20·3
N_2 = 10·0	12·4	18·7
Cal. val. gross = 480	530	480
,, ,, net = 430	470	425
Density = 0·480	0·334	0·410
Loss of energy	11 p.ct.	11 p.ct.

The effect upon the plain coal gas in Table 3, with its low carbon monoxide content of 9 p.ct., gross calorific value of 5315 k.cal. [595 B.Th.U.], and density of 0·46, the calorific value would be increased to 5620 k.cal. [630 B.Th.U.], and the density reduced to 0·33. Here again, dilution with about 20 p.ct. of inerts would produce a reasonably normal gas of 4520 k.cal. [505 B.Th.U.] with a density of 0·48.

TABLE 3.—*Influence of CO and CO_2 Extraction upon Gas Properties.*

Original Gas.	After Extraction of CO and CO_2.	With Subsequent Addition of 20 P.Ct. Inerts.
CO_2 = 3·0	..	..
C_mH_n = 4·0	4·0	..
CO = 9·0	..	..
H_2 = 48·0	54·5	..
CH_4 = 28·0	31·8	..
N_2 = 8·0	9·1	..
Cal. val. gross = 595	630	505
,, ,, net = 530	570	..
Density = 0·46	0·33	0·48
Loss of energy	5·1 p.ct.	5·1 p.ct.

ANOTHER ABSORPTION PROCESS.

Another possibility which has to be considered is the absorption of the carbon monoxide by means of alkalies—a process which finds practical application in the chemical industry in another connection. According to the temperature and pressure conditions employed, the carbon monoxide and alkalies form carbonates (at 400° C. and 100 atm.) or formates (at 120° C. and 8 atm.). Of these two, the carbonate process must be ruled out from present consideration, as it can only be used for the absorption of small quantities, and in any case it does not effect complete absorption. The formate process is technically quite practicable, though the enormous quantities of formates which would be derived from the carbon monoxide of town gas could never be marketed. The total annual consumption of formic acid in Germany amounts to only 5000 tons, while in Berlin alone the gas production would yield 125,000 tons. It therefore seems hardly worth while giving further consideration to the process.

(To be continued.)

OFFICIAL CERTIFICATION OF GAS APPLIANCES.

From the 1929 Report of the French Committee on Popularizing Gas.

During the past year, the "Commission de Vulgarisation et Applications" have directed the major part of their attention to the question of stamping gas apparatus. They have realized how vital it is to the industry that consumers should have only those appliances which will give them complete satisfaction; and in their opinion there is no better way of ensuring this than officially certifying such apparatus as fulfils a reasonable minimum of agreed conditions. The Association Technique, as a matter of fact, is in its action following in the track of the gas industries of Denmark, the Netherlands, and the United States.

The Committee have found the elaboration and launching of a scheme to be no easy matter, and have had to devote to it many laborious meetings; but after a year of working during which every aspect has been closely examined, they have been able to put forward a concrete plan. Hot water boilers, geysers, accumulator water heaters, and domestic cooking appliances have been dealt with successively, and the conditions which they must fulfil to merit badging have been set out as briefly and as clearly as possible. The work will be continued on the remaining classes of apparatus. The Committee feel that, apart from other advantages, the institution of official certification constitutes one of the best forms of propaganda, and, further, that it tends to develop close co-operation between the gas engineering and the appliance manufacturing branches of the industry.

RULES.

The objects of badging are:

(1) To furnish the public with the means of acquiring with certitude such gas apparatus as possess the qualities of sound working, solidity, durability, output, safety, convenience, and appearance.

(2) To make a lasting contribution to the improvement and the perfecting of appliances.

FORMALITIES.

Any person wishing to submit for stamping an appliance which he has constructed must—

(1) Address to the Association Technique a request on a special form, accompanied by a complete statement showing: The full name of the appliance; its characteristics (capacity, output of the burners, needs which it fulfils, selling price, &c.); a detailed description, with drawings; and method of use, which will preferably be engraved on a metal plate incorporated in the appliance.

(2) Undertake not to display on any prospectus or catalogue other figures as regards performance than those indicated after the tests have been carried out.

(3) Pay a sum, the amount of which will be fixed each year by the Association Technique for each class of apparatus.

(4) Send at his own expense, to the addresses given by the Association Technique, two identical examples of the appliance in question. These will be submitted to tests; and one of them will be retained by the Bureau during the period of validity of the badge.

CONDITIONS TO BE FULFILLED.

In order to merit badging, every appliance submitted must fulfil a certain number of conditions as laid down by Specifications set up by the Committee of the Association. These Specifications will not necessarily remain unchanged, but may be modified after a minimum of two years as the Association considers necessary in order to keep in line with advancement in construction. In any case, such modifications will not come into force until a year after their publication.

GRANTING AND VALIDITY OF THE BADGE.

Apparatus sent by the manufacturer will be submitted to the examination of two laboratories, which will certify if the apparatus fulfils the conditions laid down by the particular Specification. The laboratories will draw up reports from which the Committee of the Association will decide whether or not to award the badge. The right to employ a badge will remain valid for two years—that is to say, the badge may be affixed to all identical pieces of apparatus which may be turned out during the two years following the date of the award. After that period, the privilege may be renewed year by year without charge if the manufacturer's statement is accepted that the appliance still fulfils the stated conditions.

When the Specifications are modified in any way, the following procedure will be adopted. For six months after the date

of publication of the amended Specification, the badge will continue to be granted under the old conditions. For the six months immediately preceding the publication of the new Specification, a badge may be granted in advance to such apparatus as is known to fulfil the new conditions. In the latter case, the period of validity of the badge will commence from the date of publication of the Specification.

The Actual Badge.

The badge itself will be a small engraved brass plate showing the date; and it will be firmly affixed to the appliance in the position considered most favourable by the manufacturer. Paper certificates of the same design but much larger should be prominently displayed on apparatus in shops and showrooms. Necessarily, the manufacturers will obtain the badges and certificates from the Association Technique.

THE SPECIFICATIONS.

General Conditions.

Each appliance submitted for stamping must fulfil the requirements from the following points of view: Solidity, durability, safety, convenience, appearance, and economy in use. Further, it must conform to the following general prescription.

All apparatus must be capable of working properly at all pressures between 45 and 80 mm. [1·75 and 3·12 in.].

All domestic heating apparatus must, without exception, be furnished with a flue for the complete evacuation of the products of combustion; and the flue must be so disposed as to be incapable of being obstructed in any way. The same will apply to water heating apparatus of which the consumption is over 500 litres [110 galls.] per hour.

Water heating appliances of all sorts must be fitted with automatic safety devices; and those which are intended to heat the water beyond 50° C. must be supplied with means for removing boiler scale.

Cases in which the flame of the burners cannot be seen will not be admissible. In normal working, blue flame burners must be able to resist, without adjustment of the air and without lighting back, rapid or progressive movements of the tap from full on to shut.

Each appliance must be clearly designated by name or by number, or by a combination of the two.

When put up for sale, apparatus must be accompanied by instructions clearly setting out, with drawings, their method of working. Such instructions should specify such adjustments as the consumer can, and should, carry out for himself, and those for which he should demand the attendance of a specialist.

The test conditions specified hereafter for each class of apparatus are scheduled for a pressure of burner of 60 mm. [2·34 in.] W.G., and a gas of C.V. 4500 calories per cub.m. [505·8 B.Th.U. per c.ft. at N.T.P.].

[Of the several Specifications which follow, we select that for geysers and that which applies generally to the burners of cookers.]

Instantaneous Water Heater.

By "useful capacity" (*puissance utile*) is meant the number of heat units capable of being transmitted to the water per minute; and it will be determined for each appliance with the water at 15° C. at inlet and 40° C. at outlet. Instantaneous heaters will be classified as "water heaters" and "bath heaters;" the dividing line being a useful capacity of 200 Calories [792 B.Th.U.] per minute.

"Water Heaters."

The efficiency $\left(\frac{\text{heat units absorbed}}{\text{heat units supplied}}\right)$, measured with inlet water at 15° C. and outlet water at 45° C., must be at least 65 p.ct.

The maximum consumption allowable for flueless heaters is 500 litres [17·5 c.ft.] per hour.

Analysis of products of combustion must show a $CO : CO_2$ ratio not greater than 0·01.

All apparatus functioning under pressure must withstand a test pressure of at least 12 kg. per sq. cm. [170 lbs. per sq. in.]; and in cases where a sudden access of pressure is not impossible, 3 kg. per sq. cm. [42·5 per sq. in.].

In every pressure water heater provision must be made to cut out the gas supply so long as water is not circulating.

In every appliance it must be possible to control the burner according to the pressure at the point of use.

"Bath Heaters."

Larger geysers will not be accepted for badging unless the useful capacity exceeds 300 calories [1188 B.Th.U.] per minute —that is to say, unless capable of raising 12 litres [2·64 galls.] of water from 15° to 40° C. in 1 minute.

The efficiency must be at least 75 p.ct.

Flue samples of the products of combustion must give a $CO : CO_2$ ratio not greater than 0·01.

Pressure heaters must resist at least 12 kg. per sq. cm. [170 lbs. per sq. in.]; others a pressure of at least 10 m. [396 in.] W.G.

Every heater must comprise an automatic cut-out, or thermostat, or other means to prevent gas passing when water is not circulating.

In the lower part of every heater there must be an orifice adapted to take a pipe for induction of primary air direct from the open air, if necessary.

The pilot light must be visible, and of such design that even with the supply as low as possible there can be no doubt of the main burner igniting.

All geysers sold must be accompanied by full instructions as to fixing, and be labelled to show their "useful capacity" in heat units per minute, the normal yield of hot water, and the normal gas consumption per minute for gas of 3500 and 4500 calories per cub.m. [393 and 506 B.Th.U. per c.ft.].

Cooker Hotplate Burners.

The burners fitted in connection with cooker hotplates are classed as "open," "covered," and "enclosed." The second category comprises burners which, for appearance sake or for gentle cooking, can be covered. The third category includes all burners which are fitted beneath a "smooth top" hotplate, and are used only for indirect heating of utensils.

"Open" and "Covered" Burners.

(*a*) The consumption of every burner, in litres of 4500 cal. gas per hour, must be stated by the maker.

(*b*) The test for efficiency is carried out on 3 kg. of water heated from approximately 15° C. to 90° C. The scheduled gas consumption will be employed, and the water will be contained in a covered aluminium vessel 0·22 m. [8½ in.] diameter and 2 mm. thick. In testing a burner under a reversible grill, the most favourable position will be taken for the result.

(*c*) The efficiency and the rate of consumption of a particular burner varying inversely, within practical limits, it is provided: 1.—That every multiple burner domestic cooking appliance must have at least one burner capable of raising 1 litre of water 75° C. in less than 6 minutes. For this test a covered vessel 0·16 m. [6¼ in.] diameter and 2 mm. thick will be used. The efficiency of this burner must be not less than 45 p.ct. 2.—For slower work on the hotplate, there must be at least one burner with an efficiency not less than 50 p.ct., while a time of 7½ minutes will be allowed for the 75° C. rise in temperature.

Double ring burners will be tested with the outer ring only in action.

(*d*) Flexibility depends not only upon the degree of regulation obtainable from the tap, but upon the diameter of the burner, the orientation of the flames, and the possibility or impossibility of proportioning the flame diameter in accordance with rate of consumption. It is therefore specified—

1.—That every burner of which the normal consumption is over 500 litres [17½ c.ft.] must be capable of burning at the rate of 100 litres [3·5 c.ft.] per hour, giving a corona of less than 70 mm. [2¾ in.].

2.—That under these conditions, and using the 0·16 m. vessel specified above, the efficiency must not drop below 35 p.ct. for the outer ring of a double burner, or below 40 p.ct. for a single or a bar burner.

(*e*) Tendency to light-back will be tested as follows. A burner functioning at normal consumption on 4500 cal. per cub. m. [505 B.Th.U. per c.ft.] gas at 60 mm. pressure will be switched over to a supply of 4000 cal. [450 B.Th.U.] mixture, and must continue to burn properly without adjustment. Having satisfied this test, the burner will be supplied with a mixture of C.V. only 3000 cal. [337 B.Th.U.]; and if lighting-back occurs, the burner will only pass the test if it is fitted with an effective and convenient regulator.

(*f*) The distance of the jet orifices from the utensil must be such as to allow complete combustion. Thus the interior cones of the flames must be clearly defined even if the burner at full load is covered by a vessel 0·22 m. [8½ in.] in diameter. In testing a reversible grill burner, it will be turned into the position which gives the greatest clearance.

(*g*) Hotplate burners will be further examined from the following points of view: Protection against fouling and against extinction by the boiling-over of liquids; disposition of the jets and heat distribution; facility of dismantling, &c.

(*h*) "Covered" burners must be easily uncovered, and released by the movement of a single swivel or the like.

Totally Enclosed Burners.

(*a*) Cookers with enclosed hotplates heated by only a single burner will not be submitted for badging. Those with several burners may have one or two of the latter adapted for direct heating; and cookers with several "open" burners will be admitted even if they are fitted, in addition, with one or more permanently enclosed burners.

(*b*) The appliance having been placed in a room of 50 cub. m. [1765 c.ft.], and all the enclosed burners being lighted, the CO content of the room after 2 hours must be below 1 part in 10,000.

(*c*) The following characteristics will also be considered: Rate of heating the plate; distribution of heat on the plate; tendency to light back.

[The remainder of this section deals in detail with the test requirements of various types of complete kitchen apparatus.]

NEW MEDICAL SERVICE.

Wandsworth Company's Scheme to Promote Well-Being of All Members.

[From the "Wandgas Magazine."]

By the introduction of antiseptic surgery, Lord Lister saved more lives than were lost in all the many wars of the nineteenth century put together. That was said some years ago.

The saving work continues and is spreading every year, not only in surgery, but in the general practice of medicine; and to-day, the principle that "prevention is better than cure" is recognized in every branch of industry. The principle is old, old as the hills. The ancient Greeks knew it, so did the subjects of Tutankhamen, though they paid scant attention to its application in their own lives. Perhaps they are not altogether to be blamed, for it needed science and more particularly the growth of the scientific spirit among the public, which has followed in the wake of education, and is nowhere more manifest than in our readiness to examine and adopt new ideas, to make it possible for physicians and surgeons to pass on to the public the benefits of the discoveries of science.

To cure the sick is good; but it is far better to prevent an illness, to save a man from being ill; and the old notion of waiting till a man is in the throes of suffering before discovering what is wrong with him is now recognized by all modern intelligent people as a relic of the Dark Ages.

The irony of it is that the physician often discovers that there is nothing really "wrong" with a patient although he may suffer pain, or "isn't feeling quite up to the mark." The fact is, the man ought to be well and would be—if something which is perfectly avoidable were not making him, and keeping him, unwell. Physically, a man may be quite sound, not a giant, not a great weight-lifter with mighty muscles, but in his own class, perfectly sound. Yet you will hear him say (or whisper to a friend) that he "never feels up to the mark," or is "always a bit off colour."

What's wrong? It is just here that the physician can and does help us—*when we allow him!* A thorough examination may reveal no serious defect in the person's "make-up." But, perhaps, bad teeth are insidiously poisoning the system, leading to gout, rheumatism, digestive disorders with all their evil and harassing consequences. Or a man may suffer from headaches—not very bad perhaps, but bad enough to take the fun out of life, and gradually lower his efficiency to vanishing point. The physician may trace these nagging headaches to defective eyes—defects which the patient himself never suspected.

Put the teeth right or have a pair of glasses, and straightaway, a load is lifted from the man's shoulders, and work, and life in general, become a pleasure.

These are but two instances; they could be multiplied beyond number. It is a fact—one we had better frankly face—that with all the progress of science, with all the millions that are being spent on education every year, many people flounder along in the old way, suffering what they need not suffer if they availed themselves of the scientific guidance to be had at their call. Where we have most failed to advance with science is, perhaps, in the selection of work for which we are best fitted.

We are more careful of an engine of steel than of the incomparably more wonderful and precious engine, the human body. None of us would be so foolish as to put a 2½-H.P. engine to do work which needed a 10-H.P. engine, and how we should laugh at the man who brought a mighty steam roller to smooth his garden path! But how often do the newspapers record the fact that a Mr. John Citizen tried to lift a weight and suffered rupture with all its consequences!

The idea of "division of labour" for long has been generally accepted. The principle is unassailably sound. But the practice! In practice, the allotting of tasks to individuals was a matter of mere chance. If "Tom" applied for a job on Monday, and the only job vacant was one of lifting and carrying heavy loads, then if "Tom" looked anything "like it," "Tom" lifted and carried whether he was physically best fitted for that job or not.

That was the old way, the bad old way. It will not do in our times when the discoveries of science are available to all, and wealth is poured out in millions to teach us how best to use these discoveries. With the development of scientific management the old haphazard way of letting men go into jobs for which they are unfitted, and wherein they must suffer, was seen to be wrong, deplorably wrong, and responsible (in part) for much illness and prolonged suffering. In part, for, of course, the applicant for the job was responsible to a great extent, for his own suffering, because he did not reveal that he was unfit for (say) heavy weight lifting. He had his excuse: he wanted the job, or rather he needed the pay attached to it in order to live, and, poor fellow, he went on suffering. That was all avoidable. Under scientific management, that man would have a job for which he was fitted, with the obvious consequences of good health and the possibility of advancement to a higher position, instead of the certainty of suffering and possible breakdown.

Fear of losing his job has kept many a man from revealing his unfitness for the particular work allotted to him. In the "good old days" he probably would have lost his job if he did declare his unfitness. In our more enlightened and humane time, he is transferred to work which he is fitted to perform. There is no ground for fearing that you will lose your work if medical examination reveals that you are unfitted for the particular job you are now engaged at. The opposite is the truth. You are merely changed to a suitable occupation in which your health will return to you and wherein you may reasonably hope for advancement.

The development of scientific management, under which men are medically examined and allotted to suitable tasks, has brought with it "job analysis" as well as the more general investigation of the various operations which have to be performed in any particular industry. This has actually increased the number of jobs available, and has shown beyond the shadow of a doubt that a man who is unfit for one or even for several jobs may be perfectly fitted actually to be a leader in others. It has been shown that even the blind and very seriously maimed can perform necessary and highly useful tasks in industry.

In a big engineering works in the United States, it was found that ten jobs could be perfectly performed by blind men. Investigation showed that in all there were 7882 different kinds of jobs. Of these, less than 1000 (to be exact, 949) required strong able-bodied men; 3338 kinds of jobs could be perfectly carried out by men of average physical development; while as many as 3595 kinds of jobs could be efficiently done by the weakest men. Further investigation into what is known as "light work" showed that 2637 kinds of jobs could be done by one-legged men, 670 by men without either leg, and 715 by one-armed men.

When that investigation was complete, the Medical Officer was able to recommend changes of jobs for many men, with the result that the standard of health of the employees was vastly improved, and the calls on "sick funds" fell to a minimum.

What was achieved in that case can, and will, be achieved in the Wandsworth Company. The object of the medical inspection, which has been approved by the Directors, and is now in operation, is to save a man from suffering and ill-health by putting him into the job for which he is best fitted. Of course, you may be perfectly suitable to your present job! Then there will be no change.

It is obviously foolish for a man who is colour-blind to be trained as a fitter, only to discover when he has wasted time and effort in training, that his defect makes it impossible for him ever to be an efficient fitter. The man who suffers from some disability from birth, or caused by accident, a war wound, or in any other way, can be transferred, after medical examination, to a job in which his disability will not hinder him. He will thus cease to suffer, his health will improve, and promotion depends on himself, while if he remains in an unsuitable job, chronic ill-health may be his prospect.

The doors of the hospitals every day close upon men who tried to stick in jobs for which they were unfit. Health, comfort, and happiness beckon us all towards the work for which nature has best fitted us, and the Medical Officer is the one man who can surely tell us what that job is.

It is important to note that the medical inspection is absolutely private, and the report is seen only by the Medical Officer, General Manager, and the Welfare Officer.

The medical inspection, as affecting present employees, does not mean that anybody will lose his job. Quite the opposite! The experience of the older workers is a most valuable asset, the value of which can never be adversely affected by a medical examination.

The Company's desire is to look after the health of all its members. We know how beneficial have been the First Aid Stations, and the new development of the Company's medical service will bring far greater benefits to all. There is another way in which the medical examination will benefit the older members of the Company. It is obviously to their advantage that the standard of fitness of future employees and prospective members of the Pension Fund should be as high as possible, and that those who come into the Company's service in the future should be given jobs for which they are fitted so that their health may be preserved. The medical examination will ensure these desirable objects.

The Directors have given the fullest consideration to the

new Medical Service, have approved of the scheme, and by the time this article appears in print (July), the examination will have begun. It will proceed alphabetically, starting with the A's, following with the Z's, working week by week until the whole Company has been covered.

Once again, let it be emphasized that the fundamental idea behind the medical examination scheme is to prevent illness by finding out what job a man is best fitted for, and thus it will promote the health, happiness and real prosperity of every member of the Company. S. T. H.

ALKALI WORKS CHIEF INSPECTORS' REPORTS FOR 1928.

The reports of the Chief Inspectors of the Alkali, &c., Works, for the year 1928, have been published by H.M. Stationery Office, Adastral House, Kingsway, London, W.C., and Branches, at the price of 1s. net.

The reports are made respectively to the Minister of Health and to the Scottish Board of Health.

Report for England and Wales.

Dr. T. Lewis Bailey (the Chief Inspector for England and Wales) states that the number of works registered under the Alkali, &c., Works Regulation Act was 1096, which was a reduction of 35 on the previous year. The number of visits of inspection during the year was 3742. Speaking generally, operations have been conducted in a satisfactory manner. So much trouble has been experienced by gas managers in getting rid of the effluent from their ammonia plants that the work, initiated originally by reason of these difficulties, has been continued; and it is now possible to suggest—at any rate in a general way—steps which can be taken quite simply to ensure, in most cases, a way out of the difficulty. Further work has been done on the constitution of ammoniacal liquors. [The sections of the report dealing with gas liquor and sulphate of ammonia were reproduced in last week's issue of the "JOURNAL."]

TAR WORKS.

The number of tar works remains practically stationary. It is, perhaps, necessary to direct attention to the fact that it is now necessary to register, under the Alkali Act, not only the distillation of crude gas tar or coal tar (including, of course, dehydration by heat), but also the distillation of the products of such distillation where the evolution of any noxious or offensive gas is involved. Experience has shown the need for this. It has been necessary to require the adoption of means for dealing with uncondensed gases at various works where crude products are distilled.

It is to be regretted that several instances of inefficiency in the treatment and disposal of the foul gases from tar distillation plants have been met with. An insufficiently low temperature at the cooler during the early stages of distillation, was found on one occasion to be accompanied by considerable passage of steam. The subsequent part of the plant prior to the oxide purifier, moreover, was apparently not working freely. The result is obvious. Plant installed for a particular purpose should invariably be carefully watched, to see that it is actually doing the work that is required of it.

Where the foul gases are to be burnt, this should be done, if at all possible, at a fire which is always in use when the tar plant is being operated—such as the fire of the steam boiler, or the fire of the still itself. In cases where there is a bench of stills, the foul gases are usually taken to a common main for final disposal; but there are instances of this common main being supplied with branches leading to each still fireplace, each branch being provided with a cock. This is not at all a good arrangement.

The use of enlarged covers at the pitch outlet of tar stills has further extended. Wherever it may be necessary for men to enter stills or similar plant, facilities for their getting out quickly and easily should be increased as far as possible.

A fatality happened at one tar works, where a fire occurred which spread very rapidly to a pitch cooler in which two men were working, and it was impossible for the men to escape. It is difficult to say exactly how the fire originated; but immediately prior to it there had been in progress the operation of tar blending after dehydration, and preparation was being made for pumping the mixture away. Occurrences of this kind lead one to think that there are certain facts which are not sufficiently recognized.

Firstly, the introduction of even a comparatively small amount of water at any depth beneath the surface of hot tar, appreciably above 100° C. in temperature, may have serious results. The sudden transformation of a small quantity of water into steam will produce pressure in all directions; and the higher the temperature the greater will the pressure be. The result of dropping a little water on to boiling tar is well known; the result of its introduction below the surface may mean sudden ejection of tar from the vessel.

Secondly, it is known that tar heated initially to 150° C. can be distilled by air blowing, without further external heating. This fact should be borne in mind in cases where the blending of tar mixtures is effected by air blowing. It must be made quite certain that the temperature of the mixture is sufficiently low to obviate any evolution of volatile fractions.

BENZENE WORKS.

Works in which any wash oil used for the scrubbing of coal gas is distilled, or in which any crude benzole is distilled, have come under inspection this year. There have been 142 such works registered, the bulk of which are at coke oven bye-product plants. The amount of hydrogen sulphide evolved in the distillation of wash oil for recovery of benzene varies considerably, according to the origin of the coal. In many instances it is considerable. Emission of this to atmosphere is certainly not desirable; and steps must be taken to prevent it. The method which has been adopted generally at coke oven works is to connect vent pipes to the oven's foul gas main on the suction side of the exhauster. Run-off pipes must, of course, be sealed with the liquid; and suction on the benzole house foul gas main must be regulated. About ¼-in. suction is usually sufficient; and a water U-gauge should be provided. An incidental advantage in so dealing with the foul gases is that any benzene escaping from the vents, and formerly lost, is now returned to the coke oven system and recovered.

Where this method is not feasible, absorption by alkali, or even by oil scrubbing, may suffice. At works other than coke oven works, the treatment of waste gases from benzole distillation by passage through a loosely packed scrubber, fed with alkali, has proved satisfactory. Acknowledgment is gladly made of the excellent co-operation of works managers in attaining the ends desired.

Treatment of waste gases containing benzene by dry oxide of iron, or even by a mixture of oxide of iron and lime, is not to be recommended. Instances of explosion in the purifier, when using these materials, have been noted. This is particularly likely to happen if there is an appreciable amount of benzene, and if any local heating takes place.

MR. ERNEST LINDER.

At the end of March Mr. Ernest Linder, B.Sc., retired from the position of Chief Inspector's Assistant, after serving under four Chief Inspectors during the long period of 36 years. His work has, says Dr. Bailey, always been characterized by thoroughness. He devoted himself with untiring energy to whatever subject for research came to hand. He has particularly identified himself with the analysis and constitution of coke oven and gas-works liquors, many of the analytical methods now employed as standard methods being due to him. During the past seven years he has done excellent work on ammonia plant effluents, and likewise in connection with sulphuric acid manufacture and other industries. Dr. Bailey records his personal thanks to Mr. Linder for his ready and willing co-operation at all times.

In April last, Mr. J. S. Carter, Ph.D., M.Sc., A.I.C., succeeded Mr. Linder. To him special thanks are due for the work he has already done on many problems which have had to be solved since his appointment.

Ammonia Products Manufactured in 1928 (*Expressed as Sulphate, 25¾ P.Ct. NH_3)—Tons.*

From Liquor Produced in—	1928.	1927.	1926.
Gas-works	145,066	147,162	132,477
Other works (including coke ovens, iron works, producer gas, synthetic, &c.)	404,450	252,425	132,215
Total	549,516	399,587	264,692

NOTE.—Of the total quantity of ammonia products, the equivalent of 44,983 tons was manufactured as concentrated ammoniacal liquor; the balance of 504,533 tons consisted of other ammonia products (sulphate, chloride, nitrate, &c.).

Tar Products Manufactured in 1928.

Tar distilled	1,626,882
Pitch produced	420,749

Report for Scotland.

In his report to the Department of Health for Scotland, Mr. J. W. Young states that the number of works registered was 142. At one gas-works tar was found to have been distilled

without previous registration of the plant. The offence was condoned on payment of the omitted fees.

Ammonia Products, Tar Distilled, and Pitch Produced.

—	Salts of Ammonia.	Tar Distilled.	Pitch Produced.
	Tons.	Tons.	Tons.
From gas-works	20,364	140,664	33,821
,, iron-works	3,653	59,146	20,523
,, coke ovens	7,407	15,768	6,614
,, producer gas and bone works	5,265	8,780	5,485
,, shale works	36,036	..	..
Total 1928	72,725	224,358	66,443
In 1927	73,858	200,051	68,152

The ammonia is expressed as pure sulphate; 3772 tons were obtained as concentrated liquor ammonia, and 354 tons as ammonium chloride. About 88,000 tons of tar were dehydrated and partially distilled for road purposes.

The tar from gas and iron works increased by about 14 p.ct. during 1928, but from coke ovens it fell by about 8 p.ct.

Sulphate of Ammonia and Gas Liquor Works.

From gas-works, production of sulphate and liquor ammonia increased; but it was less from other sources. The smaller works still tend to abandon manufacture as unprofitable. A few are importing crude liquor from their neighbours, without cost, except of transport.

There has been small occasion for blame; rather there has been general improvement both in plant and practice. But again it has been necessary to warn managers as to leakages of dangerous gases, the more frequent fault being at the connection of pipes to the bell of saturators.

Irritation of skin and eyes is said to have been caused by exposure to the warmed air, charged with fine dust of sulphate, proceeding from the dryer. It has been found of benefit, where it is inconvenient to deliver outside, to wash this warm air and recover the sulphate that it is bearing away.

A reason was given for crystals being of too small a size. When men desired to complete their shift quickly, coincidently the grain grew less, because still and saturator received excessive steam.

The use of sieves, built-up of wires running uncrossed and in one direction only, extends. This form is less liable to become clogged, and also allows passage to elongated crystals.

At a works with two preheaters, fitted for alternative service, it was found that the smaller was by much the more efficient to heat crude liquor on its course to the still. But the tubes of the smaller preheater were less in diameter and more numerous. The familiar cause of defective service is from choked or leaky tubes.

Tar Works.

The weight of tar distilled increased by over 24,000 tons. There have been no complaints. Several stills have been replaced by those of improved pattern, in which heat is transferred from the cooling distillate to incoming raw tar. The device of an inverted weir, placed transversely across the upper part of the pitch-cooler, has been used by the Manager of a large works to prevent escape of fumes from hot pitch discharged from stills. This simple remedy is quite successful. It is said that producer gas is the best fuel wherewith to heat stills. A range of six is to be seen having but one patch among them during nearly 20 years.

NOTES ON NEW BOOKS.

APPLIED CHEMISTRY IN 1928.*

This annual volume is always a welcome addition to the bookshelves of all who desire to keep in touch with current developments in applied chemistry; and Vol. XIII., for 1928, in no way falls away from the high standard and value set by its predecessors. Once again Mr. A. J. V. Underwood contributes the section dealing with plant and machinery, and once again this section is extremely interesting. As was to be expected, the results of the inevitable "combine tendency" are set out; and it must be said at once that they do not disappoint. The profit made by Imperial Chemical Industries, Ltd., who continue to extend their operations, is an instance of what is occurring throughout the world. Of the chemical industry, one branch shows amazing development—that of nitrogen fixation; the total world production of all forms of fixed nitrogen having increased by 34 p.ct. for the year ended June 30, 1928, compared with the previous year. Since the publication of the volume under notice, there has been the fertilizer agreement between the Chilean Finance Minister and Imperial Chemical Industries, Ltd., having for its purpose closer co-operation between synthetic nitrogen and Chilean nitrate of soda. There has also been a similar agreement between the Chilean Finance Minister and the I.G. Farbenindustrie A.G., and between the latter Company and Imperial Chemical Industries, Ltd. Altogether gas-works sulphate of ammonia is hardly the belle of the ball.

Regarding power generation, Mr. Underwood refers to the increased attention which is being paid to air preheating, steam accumulation, automatic boiler control, and high-pressure boilers. At present the highest pressure used in a commercial installation in this country is 600 lbs. per sq. in., though a description has been published of a Continental power plant operating with a steam pressure of 1700 lbs. per sq. in. Mention is made of Sir Alexander Gibb's survey of the economics of power as applied to chemical engineering.† In connection with future developments of water power in this country, it was pointed out that substantial resources are available, but that the capital cost of development would bring the cost of power to a figure approaching that attainable by the best steam plants.

The subject of fuel is dealt with by Mr. H. J. Hodsman, of the Department of Coal Gas and Fuel Industries of the University of Leeds, and is remarkably complete in its treatment. He characterizes the year 1928 as one of conferences and attempts at closer co-operation; and he expresses the opinion that the next few years will see a marked development in the organization of the supply of gaseous fuel in this country. Interesting possibilities arise, he remarks, with the development of a gas grid carrying gas at high pressures; and he queries whether the present methods of purification and drying of gas will remain. However ideal such organized schemes may be, there is much to be said for the retention of a certain local freedom of action as an insurance against a nation-wide paralysis by cutting off supplies of fuel and power.

Regarding low-temperature carbonization, Mr. Hodsman says it is hopeless to expect that any low-grade cheap slack can be converted into an acceptable domestic fuel. Such coal must perforce be clean or previously cleaned, and it is unlikely that a raw material of this quality will remain cheap when methods for converting it into a high-priced fuel have been successfully established. It must be borne in mind that the coke produced would compete with and depress the value of the high-priced house coal, which now bears more than its share of mining costs, and these costs would have to be carried by the stacks to an increasing extent. These considerations render the future of such processes somewhat obscure.

The section on "Gas, Carbonization, Tar, and Tar Products" is by Mr. H. Hollings, of the Gas Light and Coke Company, who also refers to the proposals relating to long-distance transmission of gas, and gives an excellent account of the recent developments in low-temperature carbonization. It is evident, he observes, that the gas industry is fully alive to the possibilities of widening its market for domestic fuel by the adoption of low-temperature in conjunction with high-temperature carbonization; but it still remains to be demonstrated that it can adopt this policy on a large scale with economic success. From a consideration of many of the published analyses of low-temperature tars, it is evident that caution is necessary in the interpretation of results, and particularly in their application to other conditions. To a very much greater extent than is the case with high-temperature tar, the nature of the low-temperature product is influenced by the nature of the parent coal and of the carbonizing process. Both Mr. Hollings and Mr. Hodsman give clear reviews of the work done on coke production and utilization problems.

Mr. W. J. Rees is responsible for the section on refractories, ceramics, and cements.

ENGINEERING ECONOMICS.*

"Engineering Economics," by T. H. Burnham, is a most readable volume. It has been specially written for the assistance of young engineers seeking to specialize on the administrative side, and covers the engineering economics syllabus of the examination for Associate Membership of the Institution of Mechanical Engineers; but it will appeal to a far wider field of readers than that composed of students. It is the ability to look beyond the technical phase of a proposition, and appreciate the business aspect, that makes an engineer capable of being a real executive; and "Engineering Economics" is calculated to be of great help in enlarging the vision of the technician. The book is an outline of economic principles and of works organization and management which have a special bearing on engineering industries. Such subjects are discussed as bank-

* "Reports of the Progress of Applied Chemistry issued by the Society of Chemical Industry," Vol. XIII., 1928. Price 7s. 6d. to members, 12s. 6d. to non-members.

† Presidential Address to the Institution of Chemical Engineers.

* "Engineering Economics," by T. H. Burnham, B.Sc., B.Com., A.M.I.Mech.E. Published by Sir Isaac Pitman & Sons, Ltd., price 10s. 6d. net.

ing, foreign exchanges, trade and credit cycles, taxation, trade unions and employers' associations, insurance, industrial management and organization, works design and planning, standardization, co-partnership, costing, legislation, welfare, and research. The style of the author is neat and clear, and what he has to say is worth reading. Purchase of "Engineering Economics" is an excellent business proposition for the student.

PIPE AND TUBE BENDING AND JOINTING.*

Gasfitters will find this practical treatise on the bending and jointing of pipes and tubes very useful indeed, particularly as few text-books exist on the subject. The volume, which deals with lead, copper, aluminium, zinc, tin, and iron and steel tubing, is well illustrated; and the author's manner of setting out the facts will be much appreciated both by the beginner and by the fully-fledged fitter. A final chapter on miscellaneous matters is not the least interesting in the book.

* "Pipe and Tube Bending and Jointing," by Stanley P. Marks; published by Sir Isaac Pitman and Sons, Ltd., price 6s. net.

ACCOUNTS OF GAS COMPANIES, 1928.*

The "Gas World" Analyses of Gas Companies' Accounts, which is published annually, needs no introduction, for its practical utility has found for it a place in the office of the gas engineer. The latest issue, that for 1928, has just been published, and in both matter and form of presentation it follows the standard set by its predecessors.

* The "Gas World" Analyses of Gas Companies' Accounts, 1928. Published by Ernest Benn, Ltd., price 21s. net.

RICHMOND'S WARRINGTON WORKS.

Visited by the Liverpool Gas Company's Distribution Department Guild.

On Saturday, July 6, seventy members of the Liverpool Gas Company's Distribution Department Guild paid a visit to Richmond's Grappenhall Works at Warrington. Mr. H. J. Harding, the Assistant Superintendent, was in charge of the party, and the visitors were welcomed by Mr. J. W. Slack, Director.

Members of the Guild were then conducted round the offices and works in parties, and the various processes of manufacture were explained in detail. Grappenhall Works cover an area of over 24 acres, all the workshops being on one floor level to facilitate transport and reduce handling to a minimum. Much interest was shown in the large and imposing foundry, the daily output of which is from 30 to 40 tons of light castings. The grinding shops were also inspected. It is here that the castings receive their smooth and polished surface, the particles of metal which are ground off being drawn away from the operatives by means of a very effective suction plant which keeps the atmosphere at all times comparatively clear.

Members of the Guild were next conducted through the inspection departments, the machine shops, fitting shops, &c.

Considerable interest was aroused in the enamelling department where all wallplates, crownplates, and oven linings for "Bungalow New World," "Ranelagh New World," and other well-known Richmond cookers are prepared. Every coat of enamel imparted has to be separately "fired" in muffle furnaces at almost white heat before it finally emerges with its glass-hard surface of spotless white enamel. Enamelling on cast-iron cooker cornices, hotplate bridges, and oven feet by the new Richmond process was also examined. The special feature of this new mottled enamel is that it has an exceptionally hard, glossy surface, perfectly smooth and even in texture. Any tendency to unevenness has been entirely eliminated.

The special departments in which Richmond's "Period" and "Standard" series of gas grates receive their attractive gold, silver, stippled, and other equally popular lustre finishes were, in turn, visited. This process created much interest on account of the very pronounced growth in the demand for these pleasing lustre shades.

The visitors were also shown the department in which the new "Thermo-XX Beam" radiants are made; and the advance which these radiants mean to gas fire heating was explained. In the water heating department "Holler" and "Perfectea" boilers were inspected and tested with much interest. The visitors finally toured the new warehouse with its special equipment of overhead runways for the easy and speedy movement of goods, also the general packing shops, and the organization for the loading and transport of goods to all parts of the country.

At the conclusion of the journey round the works, the visitors adjourned for refreshments. A vote of thanks to Mr. J. W. Slack and his co-Directors was proposed by Mr. H. J. Harding, and seconded by Mr. Walter Andrews. Mr. W. Burgess, Chairman of the Guild, proposed a vote of thanks to the workmen, who had given up their Saturday afternoon in order to make the visit of the Guild more interesting and instructive.

AMMONIACAL LIQUOR AS FERTILIZER.

Translated in abstract from the "Journal des Usines à Gaz."

Many gas-works produce so little ammoniacal liquor as to prohibit the idea of working it up themselves; and the cost of transport to central stations is often high enough to place that method of disposal beyond the bounds of practical politics. Thus in many cases the only possible means of disposing of the product is to run it to waste, which not only deprives the undertaking of revenue but destroys a valuable fertilizer. M. Paturel, Director of the Saône-et-Loire Agricultural Station, quotes the instance of a small works producing on the average 300 litres of liquor per day, or rather more than 100 cub.m. [220,000 galls.] per annum. The liquor contains 16 kg. of ammoniacal nitrogen per cub.m. [2·57 oz. per gallon]; and as the whole is run to waste, it means the loss annually of 1600 kg. [1·6 tons]—equivalent to 8000 kg. [8 tons] of sulphate of ammonia.

Research has been carried out in Germany, Denmark, and France into the possibility of using the liquor direct as fertilizer; and this has demonstrated that while the practice is well within the bounds of possibility, and may even be said to give excellent results, nevertheless there are difficulties, and careful precautions are essential.

ASSIMILATION OF THE LIQUOR.

Ammoniacal liquor, apart from its ammonia, contains a number of components which are veritable poisons to vegetation. There are phenols, sulphuretted hydrogen, cyanogen, pyridine bases, and naphthalene, which constituents vary widely according to the coal carbonized and the method of carbonizing. The liquor is credited with the major portion of its nitrogen in the form of ammonium carbonate—an eminently caustic salt. The balance is in hyposulphite, cyanide, and sulphocyanide; and while there may be doubt about the first two, it is very certain that phenols, pyridine bases, and naphthalene are plant poisons of a virulent nature.

Thus it was not surprising, says M. Paturel, that the tests, which were undertaken without special precautions, resulted disastrously, to the extent in some instances of the total blotting-out of the crops experimented upon.

It is possible, however, to obtain with crude liquor results comparable in every way with those from commercial ammonia salts. The carbonate of ammonia in the liquor is by no means stable when the latter is in the ground; it loses its causticity by transmutation into other ammonium salts, which are in turn acted upon by the soil ferments. The same applies to the other constituents, including the cyanide and sulphocyanide—under the action of the air, the water, and other substances in the soil, they are transformed into useful assimilable compounds. The process, however, is slow; and for this reason application to the soil must precede by several weeks the time when the fertilizing action is required.

Provided due precautions are observed, it may be said generally that ammonia liquor constitutes an excellent manure; and it is recognized as such in Germany, where for at least twenty years a large number of gas-works have disposed of their make to farmers.

METHOD OF EMPLOYMENT.

In Germany the farmers themselves fetch the crude liquor (average sp. gr. 3° Bé.) from the works; and if they do not intend to employ it forthwith on the land, it is added to a liquid manure sump or used for making a top-dressing, for which purpose it is extremely valuable. According to M. Paturel, the liquor is sprayed on to the complex residue (such as town mud) which forms the basis of the dressing; and after thorough working-up there is obtained a compost very rich in nitrogen which can be used without risk on every sort of crop. It may be advisable to mix in a certain amount of gypsum or sulphate of iron to avoid loss of the ammonia.

Alternatively, the crude liquor may be incorporated with stable manure, reinforcing the alkaline carbonates of the latter, ensuring complete rotting of the straw or litter, and thus producing more abundantly the humus which is so essential to fertility.

However, many farmers prefer the direct application of the liquor. Undiluted, it can only be used on fallow land and when the weather is hot. The immediate effect is the destruction of the weeds; and the soil can forthwith be turned in order to incorporate the manure thoroughly and to prevent evaporation.

Otherwise, the liquor must be diluted with once or twice its volume of fresh water or manure water; and application should proceed, not in sunny weather, but when it is dull and humid—all the better if it is raining or if snow is lying. The spraying must take place several weeks at least before sowing; and rain must intervene between the two operations. Heavy ground should, of course, be treated earlier than light soil.

The following table of crops shows the best time for application, and the quantity of fertilizer recommended—3° Bé. crude liquor diluted with two parts of water.

—	—	Gallons per Acre.
Potatoes	Feb.–March	712*
Vegetables (general)	March	890–1068
Carrots (before trenching)	April–May	534–712
Barley and oats	Feb.–March	801–890
Rye and winter wheat	September	1157
Pasture	In winter	712

* The figures are converted from hundreds of litres per 1000 sq.m.

The following facts are stated in our contemporary's more detailed remarks on the effect of ammoniacal liquor on particular crops.

Pastureland.—Apply liquor in wet weather or on snow. Though apparently scorched, grass is restored to extra luxuriance after the first rain. One definite case known of total destruction of moss, &c., and an increase of 20 p.ct. in the hay harvest. Gas-works liquor must on no account be used for clover.

Corn.—Avoid excessive dressing, which may induce a top-heavy growth. The effect of ammoniacal liquor has been stated to last for at least five years.

Potatoes.—In this case liquor has been said to diminish the flavour of the tubers; but this has not been proved against this fertilizer in particular.

Vegetables.—In the case of cabbage, a 33⅓ p.ct. increased crop and better quality has been reported—due no doubt to the insecticide and antiseptic nature of the dressing.

Root Crops.—Liquor diluted or not with ordinary liquid manure may be used in autumn or early spring. An increased yield of 25 to 30 p.ct. may be looked for, and the total destruction of weeds.

Fruit Trees, Roses, &c.—Liquor may be heavily applied to these from November to mid-February; but no later, as it is highly injurious to the buds. One farmer has reported that he considers its use should be confined to old trees, which will benefit greatly therefrom.

Greenhouses.—Providing great care is taken, ammoniacal liquor may be used as a soil fumigant in greenhouses; but all plants must be removed. After spraying, the house should be sealed and left for several days.

CONCLUSION.

Apart from its effectiveness as a fertilizer, ammoniacal liquor possesses considerable powers as a destroyer of insects, larvæ, weeds, and other pests. This is due to the presence of tarry matter and notably phenols, to which incidentally must be attributed its yellow colour and particular smell.

There is no cost beyond that of transport and spraying; and thus this method of utilization of gas-works liquor may be a potential source of profit to the too numerous works which at present run the liquor to waste. Attention must be given to the special points which have been mentioned; and above all it is essential to spray the soil and not the crop, except in the case of grassland.

Goutal's Method of Estimating the C.V. of Coal.—In a recent issue of the Journal of the Society of Chemical Industry Messrs. R. A. A. Taylor and W. S. Patterson detail an examination which they have carried out on Goutal's method of estimating the calorific value of coal. They state that, based on a carefully conducted proximate analysis, Goutal's method affords a means of calculating the calorific value of coals not excessively high in oxygen content with a degree of accuracy which approximates closely to the results obtained by the bomb method. In the recent Boiler Trial Code issued by the Institution of Civil Engineers, the employment of the bomb calorimeter has been recommended for ascertaining the requisite calorific value of the fuel used in a boiler trial. For such trials this is indisputably the best practice. In many works, however, the necessity arises for checking fuel deliveries at regular intervals, perhaps daily; and it is in this connection that the authors consider that Goutal's formula may be successfully employed with an accuracy probably in many cases excelled only by a bomb determination.

PEHRSON PROCESS FOR THE LOW-TEMPERATURE CARBONIZATION OF COAL.

By W. R. Chapman, Ph.D., Assoc.M.I.Min.E., A.I.C.

From a Paper before the Society of Chemical Industry at the Annual Meeting in Sheffield.

There is only one certain guide to the commercial success of a low-temperature carbonization process or plant—namely, the profit and loss account relative to a number of years' operation. However, as there are no such accounts yet available, and as there are significant reasons for desiring the economic success of low-temperature carbonization as an industry, politically because it offers means of producing a certain, if limited, quantity of oils at home, and communally because its principal product is (or should be) a smokeless fuel, it is worth while to consider all new processes, and judge whether they offer sufficient prospects of ultimate economic and technical success to justify encouragement in face of the initial expense that must be incurred, and in face also of a large number of other processes, probably competitive, which are being simultaneously developed.

It may be said categorically that, in the welter of processes which in recent years have been the subject of description in the Technical Press, or of propaganda in the Financial Press, there are many that are obviously unlikely to be able ever to produce a satisfactory profit and loss account; and no process is worthy to have attention brought to it unless it fulfils certain conditions which do at least ensure for it a reasonable prospect of achieving economic success. Such conditions, while being objectively economic, must be subjectively scientific. Without proper scientific examination and approval, there is but scant prospect of a low-temperature carbonization process achieving economic success; and this view is peculiarly apposite at present when so many processes are being tried out at public expense.

There is one such condition in particular that must play a very considerable part in the ultimate success of a low-temperature process—namely, the means of heating the charge, and, therefore, the efficiency of thermal transfer. The problem of transferring heat to a poor conductor such as coal without the advantage of the large temperature differences available for high-temperature carbonization has been the principal difficulty with which designers of low-temperature processes have been faced; and many different methods of applying heat have been proposed as means to overcome this difficulty. Such proposals have usually required the use of thin layers of material or multiplicity of units, and, almost invariably, the amount of plant to be heated, compared with the amount of charge, has been large, and fuel costs, as well as handling costs, have been high. A second primary difficulty has been to ensure the uniform heating of the coal. Without uniform heating some portion of the coal will be over-coked and will be less readily ignitable, besides which the oils distilled will probably be contaminated with products that were better absent, and some portion of the charge will be under-coked, with the result that the yield of oils will be below the maximum.

It is on the grounds that, in the Pehrson process, the maximum efficiency of thermal transfer and the highest degree of uniformity in the heating are achieved, and that it offers probably the best means to overcome these two primary difficulties, that the process is worthy to be carefully considered.

There are, of course, a number of other conditions that a low-temperature carbonization process should preferably fulfil. There are, for example, the following in regard to the products:

Semi-Coke.—The process should be able to produce lumps of semi-coke from slack coal. The lumps must be strong enough to withstand transport without fracturing or crumbling, and the amount of breeze produced must be the minimum. Certain processes do not produce lumps of semi-coke, and such processes are at a disadvantage on this account: First, because the value of a fuel may be increased by increasing its size; and secondly, and more particularly, because they do not produce a fuel suitable for the domestic market, which is the most profitable market and the one in which there is most need of a smokeless fuel.

Gas.—The gaseous bye-product should have a high calorific value. Gas of high calorific value can easily be diluted, but low-grade gas cannot easily be improved. It is now recognized that, for industrial purposes, one B.Th.U. is not "as good as another," and the lower the carbonizing temperature, the lower the proportion of hydrogen in the gas relative to carbon, and the more useful the gas.

Oil.—The yield of oil must be high and the oil must contain a high proportion of constituents with a low boiling-point and a low proportion of tarry constituents. To attain these results the carbonization should be effected at a truly low temperature, and no portion of the coal should be overheated.

There are many other features to be desired in a process: For example, it should preferably be continuous, for though an intermittent process may perhaps produce a stronger coke, there is less handling in a continuous process, and a smaller number of units, and probably, therefore, a lower operating cost, and probably also a higher yield of bye-products. The plant required should also be relatively small, simple, and easy to control. No skilled supervision should be required, and it should be possible to vary easily the temperature of carbonization to suit different requirements in the products.

It is also particularly desirable that the process should be a two-stage process, in which the coal is first preheated to remove moisture and the oxides of carbon, and the preheated coal is then taken rapidly to the temperature at which oils begin to be liberated. By carefully controlling the pre-treatment, the chemical or physical properties of the coal (or of some part of it) may be modified, and its swelling and coking properties may be partially destroyed. If oxygen is admitted during the pre-treatment, the ulmin portion of the coal is affected and the coking properties may be reduced proportionately to the degree of oxidation. On the other hand, Parr, by excluding oxygen, has been able to produce lumps of semi-coke from Illinois slack coals which in ordinary circumstances are non-coking. Besides this control over the coking and swelling properties of the coal, there are further advantages of two-stage processes which, however, need not be considered here.

It is confidently believed that the Pehrson process fulfils each one of the conditions stated. The apparatus is simple and easily controllable. The method of transferring heat is unique. It is the most efficient evolved hitherto, and it ensures the highest degree of uniformity in heating. The gas has a high calorific value (950 to 1000 B.Th.U. per c.ft.), and experiments in an intermittently-acting retort, treating charges of ½ ton at a time, have shown that by varying the conditions coking slacks can be converted into lumps of semi-coke of almost any predetermined size with only a small production of breeze. The process is continuous, and any desired temperature of carbonization can be employed.

The Pehrson Dryer.

The Pehrson process is carried out in metallic retorts the design of which is based on that of the Pehrson rotary dryer. The interior of the dryer consists of a series of gas channels arranged around the circumference, the channels being connected to a series of louvre plates. The latter form the inner boundary of the gas channels and overlap considerably, leaving a gap for the admission of gases. When the drum rotates the material mounts up the side on the louvres, and the overlapping of the louvre plates prevents any of the material resting on them from falling backwards into the gas channels. No difficulty on this score has arisen in any of the plants now operating.

By using louvres specially shaped and overlapped, it is possible to use quite deep beds of material. The effect of the deep bed is twofold. In the first place the whole of the hot gases are introduced underneath the charge (in a manner described later) and the deep bed enables all their available heat to be utilized. Secondly, with a deep bed, the material does not slide on the louvres, but travels up the side until the effect of gravity exceeds the forces maintaining contact, and then tumbles over. In an ordinary rotary dryer or kiln a thin bed of material must be used, and this slides on the surface of the cylinder and may cause considerable wear. With the deep bed employed in the Pehrson dryer this sliding action is eliminated, so that the louvres do not wear to the same extent. Furthermore, the constant tumbling-over results in thorough mixing of the material, and also maintains the highest degree of uniformity in the heating, because the heating gases are evenly distributed without any tendency to piping or channelling.

The head-piece covering the interior of the drum contains the charging hopper and also the inlet and outlet for the hot gases. The inlet consists of duct and distributor. As the drum rotates, the head remaining stationary, a succession of the gas channels is brought opposite to the gas inlet, and these gas channels correspond with the gaps in those louvre plates on which the charge is resting. Thus the hot gases are only admitted to those louvres which are at any time underneath the charge, and to none of the other louvres; and the whole of the hot gases must therefore pass upwards through the charge before they can escape from the drum. In so doing they come into really intimate contact with the material and lose all their available heat. Meanwhile, as already explained, the constant tumbling-over of the charge ensures homogeneity in the product and a uniform distribution of the heating gases.

After leaving the surface of the charge in the drum, the cooled gases are removed through the opening on the right-hand side of the stationary head-piece by an exhausting fan; the hot gases being supplied to the gas inlet by the main fan at a sufficient pressure for them to pass through the bed in the dryer. Even with a normally fairly compact material, such as slack coal, a pressure of a few inches water-gauge is sufficient for quite deep beds, because the material is being constantly loosened and disturbed by the tumbling-over motion to which

it is subject. The fan-makers have no difficulty in supplying fans for the hot gases at temperatures even higher than 600°, which is higher than is proposed for low-temperature carbonization by the Pehrson process.

The stationary head for the gas inlet and outlet has a machined face which bears against a corresponding machined surface on the cast-iron ring at the drumhead, and the expansion at the stationary head is taken up by a gland expansion joint between the gas inlet and the fan. The joint between the faces of the drum and the stationary head has been found to be satisfactory on large units (up to 11 ft. diameter), and there is no appreciable leakage of hot gas outwards or of cold air inwards. Over the greater portion of the joint the static pressure inside the dryer is atmospheric; this being maintained by balancing the two fans.

In considering the movement of the gases, one great advantage of the Pehrson dryer over other dryers may be emphasized, because it is particularly important in view of the use of the plant for low-temperature carbonization—namely, the comparative absence of dust from the exhaust gases. The gases pass out of the material under treatment with a very low velocity, because they are distributed over a considerable expanse of surface. In vertical dryers, or rotary dryers fitted with lifting flights, the velocity of the gas through the material is many times higher, and a much higher proportion of dust passes over. The whole arrangement is compact, and the high thermal efficiency and the much deeper bed of material than in other rotary dryers enable a given duty to be performed in a unit of much smaller dimensions, and with a reduced fuel consumption. A return gas conduit enables some of the exhaust gas to be recirculated; the hot gases being cooled to the required temperature by gases that are themselves warm, thus conserving heat.

Application of the Dryer to Low-Temperature Carbonization.

The application of the Pehrson dryer to low-temperature carbonization has been the subject of considerable research at Sheffield University under Prof. R. V. Wheeler, as well as in Sweden; and numerous trials have been made on a semi-large scale with most encouraging results.

The process is divided into two stages, each carried out continuously in a rotary drum similar to the Pehrson dryer. In the first, or preheating retort, the coal is subjected to gases at a predetermined temperature and with a predetermined oxygen content for a sufficient length of time to bring about such changes in the chemical composition of the coal as are required to produce the desired size of semi-coke; researches on this subject with a variety of coals treated on a semi-commercial scale having led to the belief that very close control over the product can be exercised by careful regulation of the conditions of pretreatment. The pretreated coal is brought to a temperature just below that at which oils begin to be distilled, and is then passed to a second retort, co-axial with the first, in which it is carbonized. The two retorts are separated by a special gas-tight device which enables the solid material to be transferred from one to the other without material admixture of the two gaseous atmospheres. In the second, or carbonizing, retort, the valuable oils and gas are distilled. This takes place almost immediately, because the coal is already at an elevated temperature. With some coals the rapid heating throughout the mass on entering the second retort appears to be accelerated by exothermic reactions which begin with the evolution of oils.

The heating medium in the carbonizing retort consists of the gases distilled from the coal itself, which are re-heated, either before or after the condensation of the oils, and passed back to the retort. They enter the retort at a temperature of 550° to 600° and leave at 400° to 450° according to circumstances, the heat lost being imparted to the coal.

A portion of the circulating gases is constantly withdrawn for condensation of the oils, and the remainder is passed through a recuperator, where it is heated to the required temperature; the heat being supplied by burning producer gas, gas made in the process, the breeze produced in the process, or any other fuel, convenient on account either of locality or of market conditions.

The flue gas from the recuperator is passed to the preheater, where its sensible heat is utilized. After heating the fresh supplies of coal, it leaves the preheater in two fractions, one containing the water evaporated from the coal at (say) 100° and the remainder at a higher temperature. The moist gas at 100° is sent to waste, and the remaining gases are drawn off from the inner end of the preheater and recirculated, partly to the hot side of the recuperator to prevent excessive temperatures therein and partly to adjust the temperature of the gas entering the preheater. By these means the only heat wasted, apart from radiation losses and the sensible heat of the products, is in the gas discarded at 100°. It is confidently expected that, by using all the surplus heat possible, the total fuel consumption will not be greater than the equivalent of 130 lbs. of coal per ton of coal treated. This estimate is confirmed by trials on ½-ton charges in Sweden and ½-cwt. charges at Sheffield; and, whether it will be borne out in commercial practice or not, it seems reasonable to suppose that the high efficiency of thermal transfer (which operation with the dryer has proved to be possible) must result in lower fuel costs than will obtain with other processes. Furthermore, the plant being compact (the total length of the two retorts for treating 100 tons of coal per day is only 35 ft., which length will be increased only slightly for double the capacity) and using a deep bed, there is much less plant to be heated per ton of coal treated than in many other processes, and the radiation loss should be smaller.

Products Obtained from the Process.

Based on semi-large-scale tests, the following yields are expected from a South Yorkshire coking slack (calorific value 13,250 B.Th.U. per lb.; volatile matter 33 p.ct.), the figures being per ton of dry coal, and the carbonizing temperature not more than 450°:

—	Quantity.	Calorific Value. B.Th.U.	Therms Represented per Ton of Coal.
Semi-coke	15 cwt.	14,000 per lb.	235
Oil	20 galls.	18,000 ,,	36
Gas	2750 c.ft.	950 per c.ft.	26
			297

It is estimated that, with the high efficiency of thermal transfer obtainable, the heat of 1 cwt. of coal will be sufficient to carbonize 1 ton of coal; and these yields of vendible products may, therefore, be assumed to be obtained from a total supply of 21 cwt. of coal. The yields per ton of coal actually supplied to the plant are thus expected to be as follows:

—	Therms per Actual Ton Supplied of:	
	Dry Coal.	Washed Coal with 10 P.Ct. Water.
Semi-coke	224	202
Oils	34	31
Gas	25	22
Total	283	255
Original coal per ton	297	268

Semi-Coke.—Several tons of semi-coke have been prepared at Sheffield and in Sweden from a number of coals. A hard, compact fuel containing about 14 p.ct. of volatile matter is obtained from all coking coals. It is readily ignited and gives a flickering, smoke-free flame, which is more pleasant to watch than the fires of other low-temperature cokes produced at higher temperatures. The semi-coke is homogeneous. From South Yorkshire coking slacks about 7 p.ct. of breeze is made.

Oil.—The oil obtained has d^{15} 0·99. It is translucent in thin layers and contains no suspended carbon. On fractionation transparent fractions are obtained, some of which darken on keeping. The following fractions were obtained by fractional distillation of the oils from two coals:

Range.	Barnsley Seam.	Parkgate Seam.
	P.Ct.	P.Ct.
0°–150°	24	14
150°–250°	20	30
250°–360°	32	39
Pitch	24	17

On further refining, the fractions of oil yield light spirits, tar acids, heavy oils, and wax.

The oil, being produced by distilling the coal at 400° to 420°, contains a relatively high proportion of light spirits and is free from gum-like constituents such as are always obtained by distilling at higher temperatures. It may be claimed for the process that, because of the intimate contact of hot gas and coal, lower carbonizing temperatures may be used than in any other process, and the oil is therefore of higher quality.

The gases distilled from the coal at 400° to 420° may be heated to 600° without signs of decomposition. Such gases have been circulated through the superheaters of the Sheffield retort for hundreds of hours without any trace of decomposition or carbon deposition. In this connection two points must be emphasized, as misconceptions arise if they are not appreciated—namely: (1) The coal itself is not heated above about 420°, and the products that would be obtained from the coal by distillation between 420° and 600°, which are liable to decomposition, are absent from the gas produced in the Pehrson retort. (2) The gases distilled from coal up to 450° contain no pitch or pitch-like constituents. Pitch is only formed when vapours are condensed and the condensate is heated.

Gas.—The gas obtained consists of pure distillation gases. Most of the water and oxides of carbon are removed from the coal during pre-treatment, and the gas obtained in the carbonizing retort has the highest possible calorific value—950 B.Th.U. per c.ft. An average analysis is as follows: CO_2 5, CO 7, paraffins 67, other hydrocarbons 4, H_2 15, N_2 2 p.ct. The gas is dry and is much richer in hydrocarbons than ordinary coal gas. It is ideal for enriching purposes, and would be eminently suitable for compression and storage in cylinders.

RECORDING THE EFFECTIVENESS OF PIPE COATINGS.

By S H. GRAF, Director of Engineering Research, Oregon State College.

From the "American Gas Journal."

In comparing the effectiveness of various protective coatings for underground pipe, it is frequently desirable to make a graphical record of the protected and corroded areas. The ordinary method of photographing the pipe samples is not very satisfactory, since it does not give a development of the cylindrical surface on which the protected and unprotected areas can be measured. Mr. K. H. Logan, who is in charge of the soil corrosion work at the U.S. Bureau of Standards, has developed a special camera in which the pipe is rotated and the film synchronously moved during the exposure, so that a development of the pipe surface is produced. However, this is quite a complicated machine and is not generally available to workers on corrosion. It is the purpose of this article to describe a simple, though a somewhat laborious method of arriving at the same result. It is particularly well adapted to a study of the adhesion or effectiveness of simple bituminous dip coatings, but may, of course, be applied to galvanizing or other coatings.

OUTLINE OF METHOD.

The first step in the method is thoroughly to wash the sample in lukewarm water, using a bristle brush to remove adhering soil and corrosion products. After this is accomplished the corroded areas are painted by means of a small brush with any suitable white quick drying paint.

The second step is to surround the pipe with a sheet of tracing paper cut to fit and held in place by rubber bands. The white painted areas and the black areas of remaining coating then show through clearly, and a tracing of either area may be made on the paper by the use of a camel's hair brush and India ink. By means of a planimeter the areas may now be measured, and the amount of area lost or the remaining coating may be expressed as a percentage of the total. If samples of various ages are taken, a comparison may then be made of the rate of deterioration with time or under various conditions.

If a permanent record is desired, the tracings themselves may, of course, be preserved, or may be duplicated by blue printing to provide as many copies as may be required. After the samples have been traced, the coating as well as the paint may be removed by washing with benzole and pickling in any of the customary cleaning solutions. The pipe will then be ready for further examination on the nature or extent of the corrosion. This would commonly include the measurement of pits.

The particular study in which this method was developed and used was for the purpose of determining the effectiveness of a simple bituminous coating used on steel pipe in the distribution system of the Portland Gas and Coke Company, of Portland, Oregon. The results indicated that such a coating is but a miner protection against corrosion, and that even when most carefully applied the effectiveness is quite variable. The percentage of coating lost was found to be about 26 p.ct. in three years, about 40 p.ct. in five years, and about 60 p.ct. in seven years. Since the life of pipe is determined by the time required for corrosion pits to penetrate the pipe, protection must either be general over the area or it is of but little use. Of course, from the standpoint of electrolysis, even a partial protection, because of increased contact resistance, will be of some help in reducing the amount of stray current flowing, so that in some instances even this type of coating will have some value.

LOW GAS-MAKING COSTS WITH VERTICAL CHAMBER OVEN.

By S. B. SHERMAN, General Superintendent, Wisconsin Gas and Electric Company.

From the "American Gas Journal."

Gas requirements of Racine and the surrounding territory have grown rapidly and steadily. Especially large increases in industrial gas load have been obtained through sound sales engineering, giving a favourable load factor with only moderate seasonal changes. These facts, coupled with the long cold winters of this territory, which provide an exceptionally good coke market, have given special advantages to coal gas rather than water gas. Hence when it became necessary recently to enlarge the gas-making capacity of the plant, it seemed desirable to add coal-gas units. However, the horizontal benches, of which there were 50 in the plant, were in such small units that it was not desirable or economical to extend that type of construction further.

The problem seemed to be essentially the installation of some type of carbonizing plant that would: (1) Harmonize with the present layout and machinery; (2) produce a satisfactory coke for domestic and industrial use; and (3) produce the desired quality of gas with reasonable operating and investment costs.

After some investigation all but two types of carbonizing units were eliminated, these being horizontal ovens and intermittent vertical chamber ovens. Either one of these plants, it was felt, would work in with the older plant and produce good coke. The vertical chamber oven, in their opinion, met the third condition for the plant better than horizontal ovens.

EARLIER GAS EQUIPMENT.

Before describing the ovens selected and their operation, it is of interest to consider the earlier experience of the Racine plant, as indicating further some of the reasons for the selection of vertical chamber ovens, and some of the factors which should be taken into account in any moderate-size plant confronted with the problem of adding to its gas-making facilities.

As a result of constant additions of horizontal benches in the old plant, labour conditions and costs had become serious, and a means for correcting this situation had to be faced as early as 1920. Careful analysis of the situation showed that caring for 50 individual producers and for the 300 stand pipes of the horizontal plant caused practically all of the labour trouble. These two operations accounted for respectively 40 p.ct. and 25 p.ct., or a total of 65 p.ct., of the labour cost; and they probably accounted for fully 100 p.ct. of the trouble with labour, since the two jobs were hard, hot work.

Substitution of Kerpeley machines to furnish hot producer gas for firing the benches reduced labour cost 32 p.ct., reduced fuel cost materially, and eliminated a great share of the labour trouble. Later addition of scrubber stand pipes still further reduced labour cost 45 p.ct. of the original and eliminated the second principal source of bad working conditions. However, even these improvements, with the addition of waste-heat boilers and a water-gas machine, did not appear to give the lowest possible over-all gas-making cost. As indicated above, the addition of the vertical chamber oven plant, which was erected during 1928 by the U.G.I. Contracting Company, promised the greatest advantage. The results given below apparently justify fully the selection which was made.

DESCRIPTION OF OVENS.

The vertical oven plant consists of five benches of five ovens each, with a total coal throughput per day of approximately 200 tons. Each oven is approximately 22 ft. high and tapers in horizontal section from 9 ft. 6 in. by 8 in. at the top to 10 ft. by 12 in. in section at the bottom.

The battery is equipped with a charging larry and a hot coke car which conveys the coke to the quenching equipment and the screening station, where it is prepared in the various domestic sizes. Heating of the battery is done by producer gas generated in detached Kerpeley producers. This gas comes from the producer at about 1000°, and it is somewhat further preheated in the recuperators before mixing with the preheated air for secondary combustion. The ovens themselves are built up of silica forms, but the recuperators are of fireclay refractory.

There is an oven heating wall on each side of each oven made up of a series of horizontal passes, so arranged with baffles and dampers that uniform heating from top to bottom can be arranged with no danger of concentration of heat at any part of the oven. Each heating wall is equipped with separate producer gas and secondary air adjustments, which make the control of temperature comparatively simple.

The temperature maintained in the heating flues for appropriate carbonization is approximately 2500° Fahr. at the bottom and 1600° Fahr. at the top. These temperatures are checked twice a day with a radiation pyrometer. This gives a uniform coking rate throughout, and the charge is completely carbonized in all sections of the oven at the same time. Since the ovens are only 12 in. wide, the charge is completely carbonized in 12 hours.

Each oven is equipped with an individual off-take connection at the top only. There are individual seal pots and connec-

tions to the foul main, an arrangement which makes it easy to isolate any single oven. The waste-heat boiler is used to recover heat from the out-going waste gases, and furnishes practically enough steam for use in steaming the retorts.

OPERATING METHOD.

The crushed coal for the retorts is stored in an overhead bin, from which it can be easily discharged by gravity into the charging larry. The larry has two compartments, one for coal and the other for coke breeze. The breeze is charged first into the empty oven to form a layer about 1 ft. thick on the bottom door to act as insulation to prevent the raw coal from lying on the door and failing to coke properly.

The routine operation of the oven-plant alone is handled by two men per shift, one larry man and one lower door man. There is a signal device by which the larry operator and the lower door man can communicate. When a charge is coked and ready to be dropped, the larry man raises the seal on that particular oven and opens the top doors. He inspects the gas off-take to see that it is clear and that the spray is functioning properly. He then signals the lower door operator, who releases the eccentrics on the self-sealing bottom doors, which are hydraulically operated, and discharges the coke by gravity into the hot coke car. This car is then sent to the quenching tower, being operated by means of a cable drag. The lower door is brushed off and closed, and the oven is then ready for the next charge of coal.

One man is required on each shift for quenching and handling of the coke, including operation of the screening station. The fourth man on each shift acts in a supervisory capacity, and does the odd jobs, including minor repairs around the oven plant. These four men take care of the entire coke plant, excluding coal handling and producer operation, which parts of the work are cared for by the force from the old retort and water gas departments.

STEAMING PRACTICE.

Since the straight coal gas produced in such a plant would have approximately 580 B.Th.U., it was desirable to lower the average heating value by some cheap gas down to the Wisconsin State standard of 520 B.Th.U. per c.ft. It was desired at the same time to keep the specific gravity of the gas made as low as possible, in order that the final gas sent out from the works would give the most satisfactory results at the lowest over-all cost. The use of blue gas with the oven gas seemed to meet the requirements best. Since this type of vertical chamber oven has been very successfully steamed in European practice for many years, it was decided that this operating practice would be adopted.

Each oven is equipped with an individual steam-control valve which admits the steam at the base of the oven at three different points. It has been found that a small amount of steaming is required during the fifth hour to prevent a building up of gas pressure in the base of the oven, due to the slightly expanding character of the coal mixture used. Further and more extensive steaming occurs during the later half of the carbonizing cycle for a period of approximately three hours. The average weight of steam used per charge is approximately 650 lbs., or approximately 150 lbs. of steam per ton of coal used.

The use of steam has not only resulted in the production of a large yield of a satisfactory quality of gas of reasonable specific gravity; it has also the added advantage of keeping carbon deposits on the oven walls down to such a point that scurfing periods are very infrequent.

When operating on a 12-hour coking schedule, the 25 ovens have a gas-making capacity of slightly over 3 million c.ft. of 520 B.Th.U. gas per 24 hours. The coke quality and yield have been entirely satisfactory. Very little breeze is made. The coke has proved excellent for domestic use; it is very dense and can be handled with the minimum of breakage. The domestic range size weighs about 32 lbs. per c.ft.

After seven months of operation, it is believed that the ovens have afforded all of the advantages anticipated for them. The best evidence that they have proved thoroughly satisfactory is the fact that an additional plant of the same type of ovens is now being planned. Some of the more important and significant results from typical operation are given in the following table:

Operating Results for December, 1928.

[U.G.I. Vertical Chamber Oven Plant, Racine, Wisconsin.]

Coal used	Mine-run Royal and Allison Mines, Valley Camp Coal Co.
Coal charged per oven, as charged	8494 lbs. (3·8 tons)
Coking time, gross	12 hours
Steam used per charge	654 lbs.
Steaming time per charge	3 hours
Dry producer fuel used per ton coal charged	329 lbs.* (3 cwt.
Temperature of producer gas to ovens	950° Fahr.
Gas made per day	3,030,000 c.ft.
Heating value of gas	524 B.Th.U.
Specific gravity of gas	0·46
Gas yield per lb. of coal	7·67 c.ft. (17,180 c.ft. per ton = 90 therms per ton)
Heat in gas per lb. of dry coal	4015 B.Th.U.
Waste-heat steam made per ton of coal	614 lbs.
Gas made per man-hour of total plant labour	31,000 c.ft.
Ditto following addition of second battery (estimated)	46,000 ,,

* Producer fuel has since been reduced.

HOW WAS IT DONE?

Novel Showroom Window Display at Bournemouth.

Query marks appeared recently in one of the windows of the Bournemouth Showrooms of the Bournemouth Gas and Water Company, and were visibly reflected in the countenances of those gazing through it. A somewhat unusual system of hot water fitting was on view. To one side stood a lighted geyser delivering hot water through a curved pipe into a funnel. From the side of the funnel a length of pipe projected horizontally. In line with this pipe was another, with a tap on the end of it, and from the tap hot water poured. But there was no connection between the pipe leading from the geyser and that to which the tap was screwed! Two feet of empty air separated them, but that seemed to make no difference. An unbroken flow of steaming water poured from the isolated tap into a large bowl, and the overflow, still steaming, ran away into the waste pipe.

Crowds collected and filled the pavement, until passers-by had to step into the roadway to go about their lawful occasions. Those in the back rows asked, "What is it?" while those in front argued how it was done. Opinions varied considerably. One man had a delightfully simple explanation; he maintained that "the water kept going round and round," but it failed to satisfy his hearers. Another said it wasn't real water, but even the least observant could see the splashes leaping over the side of the bowl and falling on the floor in the most convincing way, so his explanation failed to pass muster. A more ingenious spirit was shown by the man who said it was done by a system of mirrors. At that moment somebody went into the window to wipe up the water which had splashed on the floor. As he walked all round the apparatus without difficulty, the mirror theory went phut. A taxi-driver, who said his son was a hot-water fitter, advanced the opinion that the water was vaporized after leaving the geyser, drawn across the vacant space, and then condensed in the pipe before getting to the tap. Anyhow, he was going to ask his son!

The diminutive old lady who was heard to murmur "I expect there's a catch about it somewhere" was not far wrong.

The display led to considerable activity at the "Inquiries" desk; though when inquirers were told the plain straightforward truth that it was done by gas, some showed distinct signs of annoyance.

The most embarrassing case to be dealt with was that of the inquirer who wanted to have a geyser "just like that" fitted in his own house. He wanted to be up to date and have the very latest thing. The showroom staff explained patiently that the installation in the window was only experimental and that he would find the ordinary method of fitting more satisfactory in the long run. It took a long time to wean him from his purpose. [Bournemouth "Co-Partner."]

Road Construction with "Duratar."—The Australian Gas Light Company have published a booklet on the subject of modern road construction by means of their "Duratar" binder. The publication is intended to serve as a practical guide to the efficient and economical use of "Duratar" for building and maintaining durable Australian roads, and deals generally with the production and use of the tar, together with its specifications, and also with tar macadam mixtures, tar surfacing, "Duratar" emulsion, &c. Briefly, this "Duratar" is produced by a process of distillation evolved by the Australian Gas Light Company during the period of the war, and the basic constituent is coal tar pitch, fluxed with selected tar oils, and built up in quality until it reaches a stage when it is suitable as a binder for modern roads.

REGISTER OF PATENTS.

Carbonizing and Burning Bituminous Fuel. No. 301,796.

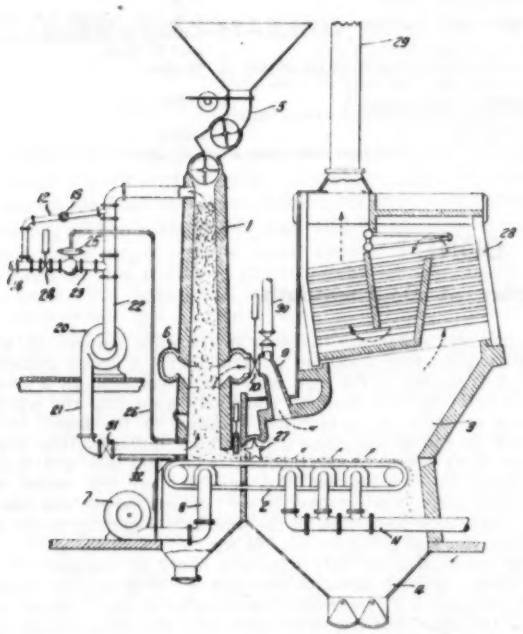
HUMPHREYS & GLASGOW, LTD., of Victoria Street, S.W. 1 (Assignees of J. M. RUSBY and W. I. BATTIN, both of Philadelphia).

No. 27,854; Sept. 28, 1928. Convention date, Dec. 5, 1927.

The objects of this invention are to effect a material economy in carbonizing bituminous fuel with the production and recovery of coal gas together with tar and other bye-products and with the economical combustion of the resulting coke and the conservation and utilization of heat; and to combine economically in one operation and one apparatus the functions of a gas plant producing gas for distribution, and of a power plant producing steam for utilization.

The invention is described in connection with the accompanying drawing—a single figure taken principally in transverse sectional elevation.

The descending fuel column is contained in a retort 1, and the bed of fuel is supported by a travelling grate 2 arranged beneath and to one side of the retort 1 and extending into a combustion chamber 3. In this case the mass of fuel is continuous, and comprises a column and a unilaterally spreading bed. From the end of the grate the ashes fall, in the present instance, into a hopper 4. Raw bituminous coal is fed to the top of the retort 1, for example, by means of a feeder 5 which does not permit of the passage of air or gas. A zone at the bottom of the column in the retort 1 and below an offtake 6 is intermittently air blasted by means of a blower 7 and its connection 8; and the blast gases at the top of the zone are led off through the offtake 6 and by way of a pipe 9 having a valve 10 to the combustion chamber 3, where they add their heat to the heat of combustion of the fuel bed, which is air blasted through connections 11. The result of this is that a small portion of the carbonized fuel is consumed in the zone above referred to with great increase in temperature, approaching incandescence in that zone, while at the same time the utilizable heat of combustion of carbonized fuel in the bed is supplemented by the heat of the blast gases. This air blasting step is intermittent; and during it some coal gas is generated in the upper portions of the column and is led off by a bleeder pipe 12 having a valve 13 and leading to a coal gas offtake pipe 14 connected with an exhauster.



Rusby and Battin's Gas and Steam Plant.

The top and bottom of the retort 1 are connected by pipes 21 and 22 with interposed fan 20. At the completion of the air blasting step the valve 10 is closed and a valve 31 in the pipe 21 is opened. The fan 20 is operated, with the twofold result that coal gas is generated in the retort 1 and re-circulated by the fan 20 and pipes 21 and 22 from the top to the bottom of the column, causing transfer of heat from the zone at the bottom of the column to the fuel above that zone, carbonizing the latter and permitting the carbonized fuel to descend to the bottom of the column where, while hot, it is fed to the fuel bed as described. Excess coal gas generated is led off through a pipe 23 provided with a valve 24 which is now open. A governor 25 in the pipe 23 is connected by a pipe 26 to the bottom of the column, and serves to keep the pressure at that point at or below atmospheric pressure in order to oppose the escape of gas at the point where the carbonized fuel is transferred to the bed.

A rotating device 27 serves to level the carbonized fuel on the grate 2 and to permit the passage of the fuel into the combustion chamber, at the same time preventing the air blast at the bottom of the descending column of fuel during the blasting period, or the gas during the re-circulation period, from entering the combustion chamber.

As shown, the combustion chamber 3 is the combustion chamber of a boiler or steam generator 28, and the heat in the chamber 3 is utilized for generating steam. The cool gases and products of combustion pass off through the stack 29. The valved connection 30 is adapted for the introduction of air into the connection 9 for burning whatever combustibles there may be in the blast gases. 32 indicates a feeder for assisting the grate to carry the carbonized fuel.

It is to be understood that the point of introduction of the re-circulated coal gas, with respect to the point of introduction of the blast to the column, may be varied in order to vary the maximum temperature to which the decomposable coal gas will be exposed during re-circulation. Also, if the carbonized fuel is fed directly from the column to the bed, increasing the distance between the point of introduction of the re-circulated gas and the point of transfer of the fuel will lessen the tendency of gas to leak from the column at the latter point.

Ladders Inside Waterless Holders.—No. 303,501.

KLÖNNE, A., of Dortmund.

No. 35,544; Dec. 3, 1928. Convention date, Jan. 5, 1928.

According to this invention, an articulated ladder is secured at its lower end to the disc, passes over a guide wheel on the cover, and is held taut by means of counterweights, which must equal not only the weight of the articulated ladder alone, but also the maximum admissible loads. Preferably the ladder is made in duplicate, the two parts being arranged opposite to each other. The two articulated ladders are supported by means of reciprocal elements engaging one within the other, so that a ladder shaft is formed, which is made up of the two oppositely lying articulated ladders and the side elements belonging thereto.

Regenerators for Coke Ovens.—No. 314,171.

WOODALL-DUCKHAM (1920), LTD., and MCEWAN, M. H., both of Victoria Street, S.W. 1.

No. 12,523; April 28, 1928.

This invention relates to regenerative furnaces, such as coke ovens, adapted to be fired with rich gas or lean gas at will. In firing with lean gas it is usual to preheat both the lean gas and the combustion air, whereas in rich gas firing, only the combustion air is preheated; and in furnaces adapted for firing by either method, it is the practice to provide one or more of the regenerators associated with the furnace with means whereby they can be supplied with air or with lean gas at will. It is the practice to provide separate inlet valves for governing the passage to the regenerator of air and lean gas respectively; the appropriate inlet valve being operated at each reversal, depending upon the mode of firing in operation, and the other inlet valve remaining closed until it is desired to change the mode of firing.

This invention provides a construction wherein the same inlet valve governs the admission to a regenerator of the appropriate gaseous fluid (either air or lean gas) independently of the mode of firing in operation. The inlet valve controls communication between the regenerator and a box having valve-controlled communications with a source of air and a source of lean gas respectively. The valves controlling communication of the box with the sources of air and lean gas are set, in accordance with the mode of firing adopted, so that either air or lean gas is admitted to the box, and, once set, do not require manipulation as long as the particular mode of firing is in operation, while the inlet valve is operated at each reversal of the regenerator, irrespectively of whether the latter is to preheat air or lean gas. The box is provided, on the side of the inlet valve remote from the interior of the box, with an extension in which the waste-gas valve is accommodated, so that the box, extension, and the several valves constitute an individual unit. Such a unit comprises a casing having two compartments, communication between which is controlled by the inlet valve; one compartment having a valve-controlled communication with the waste-gas flue and being permanently in communication with the regenerator, while the other compartment has valve-controlled communications with sources of air and lean gas respectively. Conveniently the mechanism for operating the valves is mounted on the casing and forms a part of the unit. The invention comprises a device which locks either the gas valve or the air valve in the closed position as long as the other valve is open.

Water Gas Manufacture.—No. 314,601.

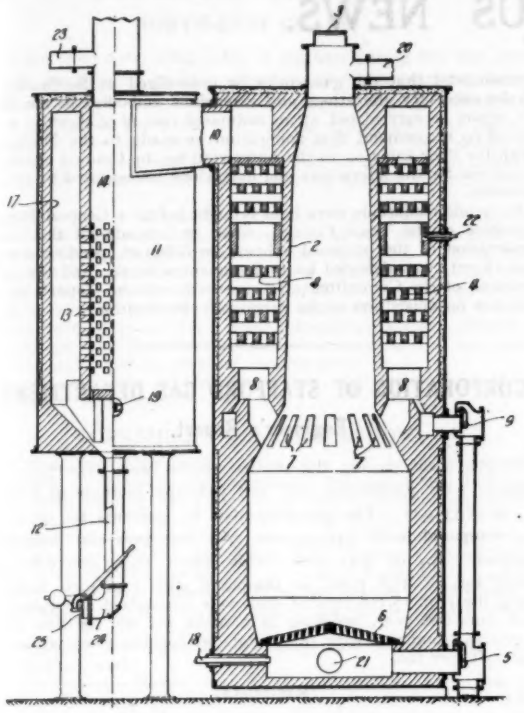
TULLY, SONS, & CO., LTD., and TULLY, A. V., both of Newark-on-Trent.

No. 10,166; April 4, 1928.

In the manufacture of gas by alternately blowing fuel to incandescence and then passing steam through the mass of the fuel, the blow causes a part of the fuel to be blown out of the stack valve in the form of breeze and dust. To prevent the loss thus represented and overcome the objection thereto, a cyclone separator is sometimes fitted to receive the discharge past the stack valve. Furthermore, provision is in certain plants made for recovery of heat of the blow gases by means of a chamber between the generator and the stack valve, in which chamber dust is trapped.

The object of the present invention is to effect an improvement whereby the fuel particles from the waste gases are more effectively arrested and separated before the stack valve is reached, with at the same time recovery of sensible heat available for the superheating

of steam in a down run following an up run or for fixing vapour for enrichment of the gas.



Tully Plant with Patent Dust Extractor.

In the accompanying drawing there is shown as employed a generator 1 of well-known type embodying a superimposed retort 2, fuel being fed through a charging door 3 at the top and descending by gravity through the retort to the generator. Checker work 4 surrounds the retort. During the blowing period air is admitted by valve 5, passes up through the fuel, leaves the fuel bed by nostrils 7, and enters a combustion chamber 8 beneath the checker work 4, where a further supply of air is admitted by a valve 9, causing combustion of the whole or a portion of the monoxide content of the blast gases. The products of this combustion pass up through the checker work surrounding the superimposed retort 2, finally leaving as by a branch piece 10 which enters tangentially a vessel 11 in such manner as to separate the dust particles in the known manner of a cyclone extractor. Owing to the speed at which the waste gases pass around 11, the particles are projected by centrifugal force and gravity outward and downward towards the outer surface, finally descending into a collecting pipe 12. The gases, free from dust and fuel particles, pass through openings 13 in a central flue 14 communicating with the atmosphere through the stack pipe and valve.

During the passage of the waste gases through the vessel 11, a portion of the sensible heat is given up to the brickwork forming the lining 17 and central flue 14 of such vessel.

With such apparatus, gas is made by admitting steam either below the grate 6, as through the inlet 18 for the up run, or into the dust extracting vessel 11 near the bottom as through the inlet 19 for the down run. In the former case the steam passes up through the fuel bed in forming gas, which gas passes up through the fuel in the retort 2 and leaves by a gas outlet 20 connected to a valved seal-box. In the second case the steam entering the vessel 11 passes up through the vessel, in which it is superheated by taking up heat from the brickwork forming the lining 17 and flue 14 of such vessel. It then passes through the branch or the connecting piece 10 referred to, and downwards through the checker work 4 and fuel, forming gas which leaves by a gas outlet 21 also communicating with the valved seal box.

When it is desired to enrich with oil or other hydrocarbon, oil is admitted at a convenient position—for example, through the inlet marked 22—to the checker work 4, where it is cracked. In such case, only a part of the water gas produced in the generator by the admission of steam below the grate is allowed to pass up through the retort and away by the associated gas outlet 20 to the valved seal-box; the remainder of the water gas produced being caused to pass up through the checker work and so carry forward to the dust extracting vessel the oil vapours produced by the admission of oil. The dust extracting vessel 11 in this case serves as a fixing chamber for the oil vapours, and the enriched water gas leaves this vessel by a gas outlet 23 adjacent to the stack valve and also connected with the valved seal-box, where it is mixed with the uncarburetted gas simultaneously leaving the generator by the gas outlet 20 near the top of the retort.

The solid material collected in the dust extracting vessel 11 is periodically discharged through a duct 24 by the opening of a valve 25.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for July 31.]

Nos. 22,395—23,186.

BENTON, W. E.—"Gas ovens." No. 22,534.
CANNON IRON FOUNDRIES, LTD.—See Benton, W. E. No. 22,534.
CLAYBON, R. T.— See Benton, W. E. No. 22,534.
GALUSHA, A. L.—"Gas producers." No. 22,617.
MACE, B. E.—"Gas meters." Nos. 23,097, 23,098.
PETERSON, S. W.—"Gas ovens." No. 22,985.
SIMPSON, S.—"Coin-freed gas meters." No. 23,156.
SOUTH METROPOLITAN GAS COMPANY.—"Manufacture of bituminous binders for road stone." No. 22,590.
SOUTH METROPOLITAN GAS COMPANY.—"Manufacture of road-surfacing material." Nos. 22,591, 22,592.
SOUTH METROPOLITAN GAS COMPANY.—"Materials for construction of roads. Nos. 22,594, 22,595.
STANIER, H.—See South Metropolitan Gas Company. No. 22,592.
SUTHERLAND, LTD., A. G.—See Mace, B. E. Nos. 23,097, 23,098.
WILLEY & CO., LTD.—See Simpson, S. No. 23,156.

LEGAL INTELLIGENCE.

GAS OVEN EXPLOSION.

A Bermondsey woman's experience with a gas oven, which it was alleged exploded when she went to look at her meat, was told in the Lambeth County Court, on Aug. 1, before Judge SPENCER HOGG. She was Mrs. Kate Palmer, a widow, and she sued the South Metropolitan Gas Company to recover £100 damages for personal injuries, and other expenses incurred through the accident. She alleged that on May 11 last, owing to the defective state of the gas oven which was installed in her premises, it exploded, and she received injuries. The defendants denied the allegations, and stated that the gas oven was not in the nature of a dangerous trap, and that a gas explosion did not occur.

Mr. DUNNO appeared as Counsel for the plaintiff, and Mr. GILBERT PAULL, Barrister, for the defendants.

Mrs. *Palmer*, in her evidence, said that the gas oven had been in her premises thirteen years, and she had kept it as clean as she possibly could. The defendants had never inspected it, and in 1927 she wrote to the Company and asked them to change it. At the beginning of April of this year the oven began to backfire. It got worse, and her daughter on May 9 wrote and asked the defendants to change it. A fitter came on May 10, who never attempted to test it, but said he would report that she wanted a new one. On May 11, a Saturday, between 11 and 12 o'clock, she lit the stove, and put her meat in the oven, and went out to fetch her little girl. When she came back she went to the oven to see her meat, opened the door, and there was a loud bang. Her eyebrows and hair were singed, and she was thrown on to the floor, bruising her forehead and ankle. She went to the doctor, who treated her for her injuries, and she was still suffering from the shock of the affair. On the same day a note was sent to the defendants, and they sent a man down who examined the cooker in her presence. He said she undoubtedly needed a new stove, and that he would report the matter. On the following Monday two inspectors came round. One said that a new stove was required, while the other suggested that such was not the case, and that the explosion was entirely her own fault. On July 15 six men of the Company called at her flat to connect the old stove to test it.

Florence Palmer, a daughter of the plaintiff, said that since the accident her mother was a different woman altogether.

Medical evidence was given as to the plaintiff's condition following the accident, the doctor saying that the flesh was burned, but that the burns were of a first degree.

Mr. *Godley* said he had examined the stove, and found that the left-hand bunsen burner was blocked with dirt, so that no air could get in. Gas had got into the oven, and when the oven door was opened, air would enter the oven, which would cause an explosion or a back-fire. In cross-examination, he said he did not think that the vapours given off by the pork would cause an explosion.

Judge SPENCER HOGG: If there were fumes from the pork, and by some reason or other there was an escape of gas, and the door was opened and oxygen let in, what would be the result?

Witness: There would be a back-fire in the oven.

Dr. *J. S. G. Thomas*, Physicist to the defendant Company, for the defence, said he had examined the oven, and found the burners in a good condition, though the oven was very dirty. The burners were working well, and in his opinion there was no escape of gas. The explosion might have been due to the carbonization of the pork. If the air ports of the oven were blocked, the possibility of an explosion was lessened.

Judge SPENCER HOGG: What is more likely to have caused the explosion?

Witness: From the examination of the stove, I should say the fatty vapours contained in the oven from the pork. There was no escape of gas.

At this stage Mr. PAULL submitted no negligence was proved, and Judge SPENCER HOGG said that, having regard to the evidence of the last witness, the plaintiff had failed to satisfy him that there was any negligence of the defendants in allowing an escape of gas. There would be judgment for the defendants, with costs.

MISCELLANEOUS NEWS.

CARDIFF GAS COMPANY'S SPORTS.

A Tribute to Mr. Madden.

Perfect weather conditions and a large gathering of spectators contributed more than a little towards the great success that attended the annual athletic sports under A.A.A. laws of the Cardiff Gas Company's Employees' Athletic and Social Club, which were held at the Company's ground, Grangetown, on Saturday, July 27. If anything more was needed to augment the success of the sports it was amply provided by the splendid running and magnificently close finishes in most of the events.

Among the competitors were several of the best known local athletes. E. J. Edwards, the Welsh four mile walking champion, and Rees Richards, the ex-champion, competed in the two mile open handicap walk, and the former scored a splendid win, while Gwyn Lewis (Roath Harriers) ran beautifully in the mile open handicap, and scored a good win.

Tribute to General Manager.

The prizes were distributed by Mr. Lawrence G. Williams, Chairman of the Gas Company; and Mr. R. G. Shute, in proposing a vote of thanks to the Chairman, Directors, and Management, said the employees greatly appreciated the help and encouragement they had always received.

Mr. James Miles, J.P., a Director of the Company, in reply, said he sincerely hoped the good feelings between the Management and staff would always continue. The Directors of that Company recognized that the cultivation of good feeling was in a large measure due to Mr. H. D. Madden, the Manager, and most of the suggestions that were helpful in this direction had come from Mr. Madden and his colleagues.

Mr. Madden, in thanking Mr. Miles, paid a tribute to the help he had received from his colleagues, especially Mr. R. J. Auckland, Mr. B. J. Bell, and Mr. F. Boardman.

BENEFITS FOR NOTTINGHAM GAS EMPLOYEES.

Contributory Pension Scheme.

The Nottingham Corporation at its meeting on July 29 adopted a comprehensive contributory pension scheme, which will benefit all sections of municipal workers, entailing an annual expenditure upon the part of the Council of £54,752. The project, which is now to be rendered capable of general application, owed its inception practically to employees in the Gas Department, who had consistently advocated superannuation for those engaged in the public service, the scheme covering those who are engaged both in the trading and non-trading branches of municipal operations.

The amount to be paid by employees under the age of 55 will be 5 p.ct. of their wages, equal to a total of £28,076. That payable by the Council will be made up of two parts—(1) an amount equal to that paid by the employees; and (2) the Council's contribution for provision for that portion of pensions which is dependent upon past service of contributors and also provision for employees over the age of 55. It is not to be made as a percentage on salaries and wages, but a fixed amount of £28,076, payable for a period of 40 years by half-yearly instalments.

Alderman Sir Albert Ball, Chairman of the Gas Committee, congratulated the Salaries Committee upon bringing forward such an excellent contributory scheme, and said he only hoped it could have been a national contributory pension scheme, so that every man could feel assured that some provision would be made for him in his old age. There was nothing more degrading to officials at the end of a long period of service than to have to come before the Council and ask for a pension. The employees in the Gas Department had established a small pension scheme of their own, and they were delighted to contribute towards it, though naturally they would prefer that the Council should adopt a comprehensive scheme such as that which had been now brought forward.

CENTRALIZATION AT BARROW-IN-FURNESS.

A £47,100 Scheme.

At the monthly meeting of the Barrow Town Council on July 29, the recommendations of the Gas and Water Committee in regard to the centralization of the gas-works were approved. At a meeting of a Sub-Committee for the purpose of considering the proposed centralization, it was resolved that the Manager prepare and submit complete schemes providing for ten beds of horizontal retorts with nine arches full and a temporary gable end left for extensions, with estimates of the cost of centralizing the gas-works at Hindpool Road and Salthouse respectively; and that the Treasurer also submit a report on the financial aspect of both schemes.

At a subsequent meeting the report of the Borough Treasurer and the Gas-Works Manager were considered, and it was then resolved to recommend that the gas-works be centralized at Salthouse, and that the necessary alterations and extensions embodied in the Manager's report be carried out at an estimated cost of £47,100. It was resolved to recommend that application be made to the Ministry of Health for their sanction to the borrowing by the Council of the sum of £47,100 for the alterations and extensions necessitated by the centralization.

The recommendations were later brought before a General Purposes Committee of the Town Council, when an amendment that further consideration of the proposed scheme be deferred, pending a report of an expert, was defeated by fourteen votes to six, and the recommendation of the Committee was approved. At the Council meeting there was no opposition to the proposed centralization.

CORPORATION OF STAFFORD GAS DEPARTMENT.

Engineer's Report.

The gas made during the twelve months was 369,677,000 c.ft., compared with 360,882,000 c.ft. last year—an increase of 8,795,000 c.ft., or 2·43 p.ct. The gas accounted for amounts to 355,701,000 c.ft., compared with 344,759,000 c.ft. last year—an increase of 10,942,000 c.ft., or 3·17 p.ct. This leaves 13,975,000 c.ft. unaccounted for, or 3·78 p.ct., as compared with 4·46 p.ct. last year. During the year 19,318 tons of coal were carbonized, compared with 19,108 tons last year, resulting in a make per ton for this year of 19,136 c.ft., compared with 18,886 c.ft. per ton last year—an increase of 250 c.ft. per ton.

Residuals.

The yield of residuals per ton of coal carbonized is as follows: Coke, 10·40 cwt., compared with 11·42 cwt. last year—a decrease of 1·02 cwt.; tar, 17·92 galls., compared with 17·21 galls. last year—an increase of 0·71 gall.; and sulphate of ammonia made has been 21·75 lbs., compared with 21·74 lbs. last year—an increase of 0·01 lb. They have received from the sale of residuals 8·587d. per 1000 c.ft., as compared with 10·346d. per 1000 c.ft. last year—a reduction of 1·759d. per 1000 c.ft.

Salaries and wages for manufacture were 2·331d. per 1000 c.ft., compared with 2·349d. last year. Repairs and maintenance of works cost £6134, against £6515 last year—a decrease of £381. Distribution has cost £6382, compared with £6573 for the previous year, or 4·467d. per 1000 c.ft., against 4·752d. last year. The profit realized on the sale of fittings and heating apparatus has been £537, against £869 last year.

During the past year the following appliances were fixed: 313 gas fires; 195 cookers; 62 wash-boilers; 63 geysers, &c.; while 539 cookers, grillers, fires, &c., were brought off from consumers' premises, and were cleaned, repaired, and refixed. New consumers for the year total 191. The charge against revenue in respect of stoves has been £3416, against £3440.

During the year 4964 yards of new mains have been laid, bringing the total length up to 61·9 miles. They have also relaid 3081 yards of old mains.

Having dealt in detail with the several departments, the result of the year shows a gross profit of £18,723, against £16,640 last year—an increase of £2083. After providing for repayment of loans, interest on capital, and income-tax, there remains a net profit of £9847, against £8283—an increase of £1563. With the amount of £1087 brought forward from the previous year, there is a surplus of £10,935, of which £2000 has been voted for the relief of the general district rate for the current year, leaving a balance of £8935, and it is suggested that this sum be dealt with as follows: £3000 to reserve fund; £3800 to renewals fund; and £2135 to be carried forward to next year.

Further Discounts.

At this meeting it was decided to reduce the price of gas by 2d. per 1000 c.ft. to consumers who were paying 3s. 2d. and upwards per 1000 c.ft., such reduction to take effect after the September readings of the meters.

The following scale will then be in force:

For a Quantity Exceeding—	But not Exceeding per Quarter—	Price per 1000 C.Ft.
C.Ft.	C.Ft.	s. d.
..	20,000	3 2
20,000	100,000	3 0
100,000	200,000	2 8
200,000	1,000,000	2 5
1,000,000	2,000,000	2 4
2,000,000	3,000,000	2 2½
3,000,000	4,000,000	2 1
4,000,000	5,000,000	1 10
5,000,000	..	1 7

Subject in each case to a discount of 5 p.ct. conditionally upon payment being made on or before the last day of the month following the quarter end.

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

There has been some irregularity in markets during the past week, but, with the shipping position showing some improvement, matters have steadied up in most departments. Better inquiry was reported towards the end of the week, and, on the whole, collieries are well stemmed for after the holiday break. Some quite good orders are reported to have been booked to the end of the year at approximately current prices, which shows that the market is in a healthy state.

The better grades of gas coal are firm, and Wear Specials are quoted at 17s. 6d. f.o.b., with best qualities at 16s. 9d. Seconds and others show some irregularity at 15s. 6d. to 15s. 9d. Coking coals have been easier, and there are still some offering for prompt shipment; but they are firming up again, and are steadily quoted for forward at 16s. 3d. to 16s. 6d. Best unscreened Durham bunkers are firmly held at round 17s., with ordinary sorts freely offered at 15s. 6d. to 15s. 9d. Best Northumberland screened steams are quoted at 15s. 6d. f.o.b., and the demand remains good.

Gas coke is quiet, but the forward market remains steady at 21s. 6d. f.o.b. for shipment.

YORKSHIRE AND LANCASHIRE.

Apart from something in the nature of a rush on export account, there is little alteration in the condition of these markets. Industrial fuel has been moving satisfactorily at recent prices. Best coking smalls have been in demand, but secondary grades were uncertain. Supplies generally continue to be equal to requirements, apart from smalls, which are in better demand on home account. Rough slacks continue to be in fair request, and gas coal is being taken in fuller completion of contract deliveries. The demand for furnace coke is stronger, with values firm on the basis of 21s. 6d. to 22s. 6d. per ton f.o.b.

The following are the Humber bunker and export prices (f.o.b. usual shipping ports):

South Yorkshire.—Hards, Association, bunkers 18s. 9d. to 19s. 3d., export 18s.; screened gas coal, export 18s.; washed trebles, export 18s.; washed doubles, bunkers 18s. 9d., export 17s. 6d.; washed singles, export 16s. 6d.; washed smalls, bunkers 16s. 3d., export 15s.; rough slack, bunkers 13s. 6d. to 13s. 9d., export 12s. 6d. to 13s.; smithy peas, export 19s. to 19s. 6d.

West Yorkshire.—Hartleys (f.o.b. Goole), bunkers 17s. 6d., export 17s. to 17s. 6d.; screened gas coal, export 18s. to 18s. 6d.; washed trebles, export 17s. 6d.; unwashed doubles, export 15s.; rough slack, bunkers 13s. 6d., export 11s. 6d.; coking smalls, export 12s.

Derbyshire and Nottinghamshire.—Top hards, bunkers 18s. 9d. to 19s. 3d., export 17s. 6d. to 18s. 3d.; cobbles, bunkers 18s. 9d., export 16s. 6d. to 17s. 6d.; washed trebles, export 17s. to 17s. 6d.; washed doubles, export 16s. 6d. to 16s. 9d.; washed singles, export 16s. to 16s. 6d.; washed smalls, bunkers 16s., export 14s. 6d.; unwashed doubles, export 16s. to 16s. 6d.; rough slack, bunkers 14s. 3d. to 14s. 9d., export 12s. 6d.

Yorkshire, Derbyshire, and Nottinghamshire.—Screened steam coal, bunkers 17s. to 18s., export 16s. 6d. to 17s.; gas coke, export 21s. to 23s.; furnace coke, export 21s. 6d. to 22s. 6d.; washed steam (Goole, West Yorkshire), bunkers 17s. 9d.; (Hull, West Yorkshire), bunkers 18s.; (Hull, South Yorkshire), bunkers 18s. 3d., export 17s. 6d.

MIDLANDS.

The seasonal slump is accentuated this week by the holidays. Some coal will be raised on Thursday and Friday, but in the absence of demand work at the pits will not be general before Monday. Prior to the holidays householders did a fair amount of stocking against autumn requirements. This applies to best coal only, of which no great stocks have been allowed to accumulate at the pits, and prices are kept at quite a firm level, with a tendency to harden. Secondary qualities for the depôt and hawking trade are plentiful, despite restricted output, amounting roughly to three days a week in Derbyshire and the Cannock areas.

Rather better time has been made in Warwickshire, but even if the stoppage lasts a full week no inconvenience will be created. The holidays were heralded with a diminution in demand for industrials of all classes, further deliveries being deferred until after the resumption. The consuming industries of the district, however, are fairly busy, and there is no reason to take a pessimistic view of the outlook. Steams are a slow market, and prices on the weak side. Coke continues scarce, and this is reflected in rather higher rates for forward engagements.

GLOVER-WEST VERTICAL RETORTS.

Recent Contracts.

The Primitiva Gas Company of Buenos Aires, Ltd., have placed a contract with Messrs. West's Gas Improvement Company, Ltd., for a second installation of their Glover-West vertical retorts. This installation is to comprise, in the first instance, four settings containing 32 retorts of the 50-in. "New Model," with buildings and all arrangements for an ultimate eight settings, and with equipment for waste-heat recovery, coal and coke-handling machinery, coke storage hoppers, and coke screening plant. The daily capacity of the new installation will be approximately 2,600,000 c.ft., which, added to the 3½ millions of the installation erected in 1924-25, gives a total daily capacity for vertical retorts at their Corrales Works of about 5¾ millions.

The Consumers' Gas Company of Toronto, Ontario, have placed a contract with the West Gas Improvement Company of America (Inc.) for an extension of the existing plant by 32 retorts of the 40-in. "New Model," while the Australian branch of the Company have secured contracts for South Brisbane of 16 retorts and for Gisborne of 4 retorts of the same dimensions, with coal and coke handling plant in each case.

At home, recent contracts include an extension by 12 retorts of the installation at Leigh; 16 retorts with provision for a further 24 as an extension of the installation at Southport, with waste-heat recovery plant, and coal and coke handling plant; an installation of 6 retorts at Maryport, Cumberland; and a particularly interesting small installation of 3 retorts in a single line at Haddington, near Edinburgh.

The Cie. Gle. de Construction de Fours, sole licensees for the Glover-West System in France, have secured an important contract for the Sté. Lyonnaise des Eaux et de l'Ecailage for 48 retorts of the 40-in. "New Model" for the Nanterre Gas-Works, lately acquired by that Company from the Cie. de l'Union des Gaz, as well as an installation of 15 retorts of the 33-in. "New Model" in units of 3 at Tarbes, and 32 retorts of the same type as an extension of the existing installation at Toulon.

TRADE NOTES.

Tar Treatment Plant for New Zealand.

The Wanganui Corporation Gas Department, New Zealand, have placed an order with the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., for a "T.I.C." tar treatment plant capable of dealing with 7½ to 8 tons of crude tar per 24 hours.

Extension of Purification Plant at Middlesbrough.

The Corporation of Middlesbrough have placed an order with Ashmore, Benson, Pease, & Co., Ltd., of Stockton-on-Tees, for the extension of purifying plant. The contract comprises four purifying boxes 40 ft. square by 6 ft. 3 in. deep, and two catch boxes 40 ft. by 30 ft. by 6 ft. 3 in. deep with connections, including 24 in. Pickering patent side valves, &c., also steel building, 220 ft. long by 49 ft. span by 40 ft. high, which will carry the boxes at a height of 13 ft. from ground, with overhead revivifying floor, having a conveyor running the full length with elevator at one end. The latter is fitted with a second chute for transferring the spent oxide to railway trucks.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Aug.* 6.

There has been little change in the prices of tar products during the past week.

Business has been reported in pitch at 45s. per ton f.o.b.

Creosote for export is 6¾d. per gallon f.o.b.

White spirits are as follows: Pure toluole, 2s. 2d. per gallon; pure benzole, about 1s. 11d. per gallon; and 95/160 solvent naphtha, 1s. 5d. per gallon.

Pyridine bases are 3s. 9d. to 4s. per gallon.

Tar Products in the Provinces.

Aug. 6.

There is a decided improvement in the market for pitch. There is a fair amount of inquiry, and makers have advanced their prices to 45s., and will not consider anything under this figure.

Creosote is quiet; but here, also, the tone is steadier.

Carbolic acid is very firm indeed, and 2s. 4d. has been bid for prompt delivery. This advance in crude is owing to the scarcity of crystals, and the comparatively high price asked for it.

Cresylic acid is still very dull, and it is difficult to interest buyers.

Water-white products are steady, with a fair amount of demand.

The average prices of gas-works products during the week were: Gas-works tar, 23s. to 28s. Pitch—East Coast, 45s. f.o.b. West Coast—Manchester, 39s. 6d. to 40s.; Liverpool, 43s. to 44s.; Clyde, 43s. to 44s. Toluole, naked, North, 1s. 7½d. to 1s. 8¼d. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 3¾d. to 1s. 4¼d. Heavy naphtha, North, 1s. to 1s. 0¼d. Creosote, in bulk, North, liquid and salty, 3¼d. to 3½d.; low gravity, 2d. to 2¼d. Scotland, 3¼d. to 3½d. Heavy oils, in bulk, North, 5½d. to 6d. Carbolic acid, 60's, 2s. 3d. to 2s. 4d. prompt. Naphthalene, £13 to £15. Salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Benzole Prices.

The following are considered to be the market prices to-day:

	s. d.	s. d.	
Crude benzole	0 10	to 0 11	per gallon at works
Motor ,,	1 5	,, 1 6	,, ,, ,,
90 p.ct. ,,	1 7	,, 1 8	,, ,, ,,
Pure ,,	1 10	,, 1 11	,, ,, ,,

CONTRACTS OPEN.

Carbonizing and Coal Handling Plant.

The Tyldesley-with-Shakerley Urban District Council invite tenders for new carbonizing and coal-handling plant. [See advert. on p. 318.]

Coal.

The Corporation of Drogheda invite tenders for the supply of gas coal. [See advert. on p. 318.]

The Sidmouth Urban District Council invite tenders for the supply of gas coal. [See advert. on p. 318.]

GAS UNDERTAKINGS ACT APPLICATION.

SPECIAL ORDER.

Chichester Gas Company.

To empower the Company to issue preference shares and debenture stock which they are now authorized to create as redeemable shares or stock; to make new provisions with respect to the sale of shares and stock by auction or tender; to alter the limit of interest payable on money to be borrowed; and to make further provision with reference to the administration of the affairs of the Company.

GAS UNDERTAKINGS ACT ORDERS.

SECTION 6.

Burntisland Corporation.

The Corporation shall, from Feb. 1, 1930, charge according to the number of British thermal units supplied, and shall on or before Nov. 1 give notice of the calorific value of the gas which they intend to supply.

Kirkcaldy Corporation.

The Corporation shall, from Jan. 20, 1930, charge according to the number of British thermal units supplied, and shall on or before Oct. 20 give notice of the calorific value of the gas which they intend to supply.

Port Glasgow Town Council.

The Council shall, from March 18, 1930, charge according to the number of British thermal units supplied, and shall on or before Dec. 18 give notice of the calorific value of the gas which they intend to supply.

Modern Methods in Birmingham.

Novel schemes for securing a cleaner atmosphere for Birmingham are shown in the annual report just issued by the Gas Department. By a system of hire and hire purchase terms, the Department has waged war on the smoke-producing kitchen range, and has succeeded in equipping over 90 p.ct. of the houses in its area where gas is available with modern gas cookers. The Department has formed a special new building section to keep in touch with architects and builders. A reduction in service charges was made to those builders who, while erecting new houses, made provision for gas wash-boilers and ran in piping for gas fires in bedrooms and other rooms where intermittent heat is required. By meeting builders in this way, it has been found possible to fit practically every new house in Birmingham with gas supply pipes, and a large number have already installed gas fires in one or more bedrooms. The measure of success obtained in Birmingham's campaign for domestic smoke abatement is reflected in the fact that approximately 237,000 gas cookers, over 125,000 fires, and 10,000 wash-boilers are installed in its area.

The Year's Results at Coventry.

The accounts of the gas undertaking of the Coventry Corporation for the past year show a total revenue of £474,043, as compared with £529,378 for the previous year. The net profit was £1425, as compared with £28,374. It was recommended that the surplus be carried forward. The Committee reported that the income had fallen by the reductions made in the price of gas and in the prices obtained for residuals, and had it not been for a saving of nearly £25,000 in manufacturing costs, the undertaking would have been faced with a serious loss. The gross profit carried to net revenue account was £102,671, as compared with £133,357 last year. Interest and sinking fund charges showed an increase owing to new loans, but expenditure on items of a capital nature showed a considerable reduction from £53,486 to £14,489. On the other hand, there was a charge for income-tax of £31,652, whereas last year, the year of the coal dispute, the liability was covered by tax on loan interest. Councillor Holt, Chairman of the Committee, moving the adoption of the report, said the price of gas had been reduced 4½d. per 1000 c.ft., while they had a reduced income by £14,000 from residuals. It had been a record year for gas sold, there being an increase of nearly 3 p.ct., but by improvements in the methods of production they had carbonized 1500 tons less of coal. They did not wish to entertain the idea of raising the price of gas, but he warned the Council not to be alarmed if they had to. The accounts were adopted.

Tottenham and District Gas Company.—Dividends in respect of the half-year ended June 30 have been declared at the following rates: On the 5 p.ct. preference stock, 5 p.ct. per annum; on the 5½ p.ct. preference stock, 5½ p.ct. per annum; and on the ordinary stock, 6½ p.ct. per annum, all less income-tax. The dividends will be payable on Aug. 10 next.

Kendal Gas Department Results.—The Borough of Kendal Gas Department accounts for the year ended March 31 showed a gross profit of £5981 and a net profit of £790, as compared to a loss in 1928 of £567, and a loss in 1927 of £2326. Over 5½ million c.ft. more gas was made with only 31 tons increase in the quantity of coal carbonized. The net proceeds of coke and other residuals on cost of coal amounted to 40·97 p.ct., against 55·50 p.ct. for the previous year. The total gas made was 123,534,000 c.ft., against 118,976,000 c.ft. last year. There was an increase in the number of consumers of 204 and of cookers 179 over the previous year. The income for gas was less by £910, due to the 6d. reduction in the price which affected six months' working.

Increased Discounts in Lancaster.

The Gas Committee of the Lancaster Corporation received authority on July 30 to revise the charges for gas as follows: Schedule A—For all gas consumed by ordinary meter: Up to 5000 c.ft. per quarter, 3s. 6d. (*less* 5 p.ct. discount in all cases); over 5000 c.ft. to 10,000 c.ft., 3s. 5d.; 10,000 c.ft. to 15,000 c.ft., 3s. 4d.; 15,000 c.ft. to 25,000 c.ft., 3s. 3d.; 25,000 c.ft. to 50,000 c.ft., 3s. 2d.; 50,000 c.ft. to 75,000 c.ft., 3s. 1d.; 75,000 c.ft. to 125,000 c.ft., 3s.; 125,000 c.ft. to 250,000 c.ft., 2s. 11d.; 250,000 c.ft. to 500,000 c.ft., 2s. 10d.; 500,000 c.ft. to 750,000 c.ft., 2s. 9d.; 750,000 c.ft. and over, 2s. 8d. Schedule B—For gas engines: Up to 60,000 c.ft. at 2s. 8d. (*less* 5 p.ct. discount); over 60,000 c.ft. and up to 250,000 c.ft., 2s. 5d.; 250,000 c.ft. up to 500,000 c.ft., 2s. 2d.; 500,000 c.ft. up to 750,000 c.ft., 1s. 10d.; 750,000 c.ft. up to 1,500,000 c.ft., 1s. 7d.; 1,500,000 c.ft. and over 1s. 5d. per 1000 c.ft. Mr. Till (Chairman of the Gas Committee) referred to the proposed reduction in the price of gas on a basic proportion to use. In 1926, owing to the coal dispute, they had to increase the price of gas by 7d. per 1000 c.ft. They had not been able to take this off. There was a serious slump in the price of residuals, which represented 4d. per 1000 c.ft. on the gas sold. Large consumers were subsidizing small consumers. The cost of the reductions would be £3500 for the year, but they hoped to save on the estimates. The price of 3s. 6d. per 1000 c.ft. (or 3s. 4d. net) in Lancaster was below the average of many towns, which was 3s. 7d. per 1000 c.ft. Being a long way from the colliery, 8s. per ton was paid in carriage, or 6d. per 1000 c.ft. on the cost of gas. The new schedule was a definite encouragement to large consumers. Alderman Roberts supported the minutes, and Mr. Ward pressed for an early reduction of gas charges to the poor, which, Mr. Till said, would come as soon as possible.

Price Reduction in Liverpool.—The price of gas in Liverpool is to be reduced to all consumers. After last June quarter readings, the price of gas supplied through ordinary meters will be 7·4d. per therm (approximately 2s. 11d. per 1000 c.ft.). The charge for gas supplied through prepayment meters, on and after Aug. 1, will be reduced to 8·9d. per therm, or 3s. 6·275d. per 1000 c.ft.

Wandsworth, Wimbledon, and Epsom District Gas Company.—The Directors have declared dividends on the capital stocks of the Company for the six months ended June 30, at the following rates p.ct. per annum: On the 5 p.ct. preference stock, £5; on the Wandsworth "A" stock, £9; on the Wandsworth "B" stock, £7 10s.; on the Wandsworth "C" stock, £6 6s.; on the Wimbledon stock, £7 2s. 6d.; on the Epsom stock, £7 12s. 6d.; and on the new ordinary stock, £6 6s.

Scotch Week in the Isle of Man.—In connection with the annual Scotch Week Gathering in Douglas, great tribute is paid to the energy of Mr. A. R. Bissett, Manager of the Douglas Gas Light Company, for instituting attractive innovations in the programme and for contributing generally to the success of the festival. It was Mr. Bissett (who, by the way, went to the Island three years ago last April) who originated the idea of providing games which would attract Scotch people to the gathering. Mr. Bissett is also Chairman of the St. Andrew's Pipe Band, of which he was the originator.

Glastonbury Gas Department Report.—The annual report on the work of the Glastonbury Gas Department for the year ended March 31 last has been presented by the Secretary and Manager, Mr. D. E. Garlick. The total quantity of gas made amounted to 55,375,900 c.ft., of which 50,669,500 c.ft. were sold—5·3 p.ct. being unaccounted for. The amount of coal carbonized during the year under review was 4665 tons, from which were produced 1265 tons of coke, of which 2301 tons were sold, 214 tons of tar, and 32 tons of sulphate of ammonia. The total expenditure was £13,165, and the total income from sales of gas and residuals, stove and meter rentals, &c., amounted to £19,704, which leaves a balance on net revenue account of £6539 to be carried to the current year.

Successful Exhibitors at Sheffield.—Among the recipients of awards given by the Royal Sanitary Institute at their recent Congress and Exhibition at Sheffield were the following: *Rogers Field Medal.*—Low-Temperature Carbonisation, Ltd., of London (for an exhibit of "Coalite" radiant smokeless fuel). *Silver Medals.*—Sidney Flavel & Co., Ltd., of Leamington Spa (the Flavel gas cooker); Guest & Chrimes, Ltd., of London (water fittings); Newton, Chambers & Co., Ltd., of Thorncliffe ("Izal" germicide); and the Sheffield Gas Company (gas cooking and heating appliances). *Bronze Medals.*—Sidney Flavel & Co., Ltd., of Leamington Spa (Flavel's Leamington gas fires); and Meldrum's, Ltd., of Timperley (Meldrum "Sprinkler" stoker). *Deferred for Further Consideration or Practical Trial.*—Western Heating and Stove Company, Ltd., of Bristol ("Ever Hot" gas water heater).

British Industries Fair.—Over six months before the opening of the next British Industries Fair, only 5 p.ct. of the total space in the new and enlarged Olympia, where the London section of the Fair is to be held from Feb. 17 to 28, remains unlet. In some trade sections of the London Fair there is no room left at all. This announcement was made at the Department of Overseas Trade on Tuesday, July 30, at a meeting of the Advisory Committee of exhibitors in the London section of the Fair, over which the new Minister for Overseas Trade, Mr. G. M. Gillett, M.P., presided for the first time. The arrangement of the various trade groups in the Olympia buildings was agreed upon, and a Sub-Committee was appointed to consider the question of improving the general appearance of exhibitors' stands. It is stated that the applications for space in the heavy section of the Fair, which is held simultaneously in Birmingham, are such that the question of further extensions is again becoming urgent.

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. Aug. 2.	Rise or Fall on Week.	Transactions Lowest and Highest Prices.
£			%p.a	% p.a.				
171,978	Stk.	Feb. 7	5	5	Aldershot 5 p.c. max. C. .	70—75	..	..
412,992	,,	,,	4	4	Do. 4 p.c. Pref. . .	73—76	..	..
1,551,858	,,	Apl. 11	7½	7½	Alliance & Dublin Ord. .	96—99	..	96
374,000	,,	July 11	4	4	Do. 4 p.c. Deb. . .	62—65	..	..
522,655	,,	Mar. 7	7	7	Barnet Ord. 7 p.c. . . .	115—118	..	114½—116½
300,000	1	May 9	1/4½	1/4½	Bombay, Ltd.	19/-—21/-	..	19/-
172,500	10	Mar. 7	8½	9	Bournemouth 5 p.c. . . .	13—13½	..	13½
500,050	10	,,	7	7	Do. B 7 p.c. . .	12⅞—12⅞	..	..
439,160	10	,,	6	6	Do. Pref. 6 p.c. .	10½—11½	..	..
50,000	Stk.	July 11	3	3	Do. 3 p.c. Deb. .	54—57	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb. .	72—75	..	..
357,900	,,	Mar. 21	7½	7½	Brighton & Hove 6 p.c. Con.	113—116	..	..
371,880	,,	,,	6⅔	6⅔	Do. 5 p.c. Con.	100—103	..	..
1,287,500	,,	July 25	5	5	Bristol 5 p.c. max. . . .	87½—88½*a*	..	..
855,000	,,	Apl. 11	8	7½	British Ord.	117—120	..	119½
100,000	,,	June 27	7	7	Do. 7 p.c. Pref. . .	112—117	..	117
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. .	71—74	..	73
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. .	94—97	..	96½—96½
100,000	10	May 30	6	8	Cape Town, Ltd. . . .	8½—9½	..	..
100,000	10	Apl. 24	4½	4½	Do. 4½ p.c. Pref. . .	6½—7½	..	7—7½
150,000	Stk.	June 27	4½	4½	Do. 4½ p.c. Deb. . .	71—76	..	..
626,860	,,	July 25	6	6	Cardiff Con. Ord. . . .	95—98*	..	..
327,860	,,	June 27	7½	7½	Do. 7½ p.c. Red. Deb. .	99—102	..	..
187,150	,,	Feb. 21	5	6½	Chester 5 p.c. Ord. . . .	88—93*b*	..	..
98,935	1	May 9	1/2/-	1/2/-	Colombo Ltd. Ord. . . .	35/—37/-	..	..
24,495	1	,,	1/4½	1/4½	Do. 7 p.c. Pref. .	20/—22/-	..	..
375,402	1	Apl. 11	1/9½	1/9½	Colonial Gas Assn. Ld. Ord.	24/6—26/6	..	..
187,848	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	20/6—22/6	..	..
2,073,280	Stk.	July 25	7	5	Commercial Ord. . . .	94—97*	—1	94—94½
475,000	,,	June 13	8	8	Do. 8 p.c. Deb. .	56—59	..	..
787,560	,,	Feb. 21	7	7	Croydon sliding scale . .	110—113	..	112
409,100	,,	,,	5	5	Do. max. div. . . .	83—86	..	..
542,270	,,	Mar. 7	7	10	Derby Con.	112—117*e*	..	..
55,000	,,	June 27	4	4	Do. Deb.	68—71*e*	..	..
909,000	,,	Mar. 7	5	5	East Hull Ord. 5 p.c. . .	73—75	..	..
1,009,180	10	Mar. 21	†4	†7	European, Ltd.	16—18	..	16⅞—17½
15,708,480	Stk.	July 25	5⅔	5⅔	Gas Light & Coke 4 p.c. Ord.	18/9—19/3*f**	+-/3	18/6—19/3
2,690,000	,,	,,	8½	8½	Do. 8½ p.c. max. . .	61—63*	..	61½—62½
4,187,020	,,	,,	4	4	Do. 4 p.c. Con. Pref. .	74—76*	..	74—75½
5,639,630	,,	June 13	8	8	Do. 8 p.c. Con. Deb. .	57—60	—1	57—57⅝
3,643,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. .	97—100	..	99½—99⅝
89,500	,,	Mar. 21	7	7	Hastings & St L. 5 p.c. Conv	98—103	..	..
248,740	,,	,,	5½	5½	Do. 5½ p.c. Conv.	80—85	..	..
70,000	10	Apl. 24	†10	†10	Hongkong & China, Ltd. .	14—15	..	..
212,100	Stk.	Mar. 7	5½	6	Hornsey Con. 5½ p.c. . .	86—89	..	..
1,976,000	,,	May 30	10	20	Imperial Continental Gas.	355—375	—10	360—365
322,130	,,	Feb. 7	8½	8½	Do. 8½ p.c. Red. Deb.	70—73	..	..
235,242	,,	Mar. 7	7½	8	Lea Bridge 5 p.c. Ord. . .	117—120	..	..
2,145,907	,,	Feb. 21	6½	6½	Liverpool 5 p.c. Ord. . .	95—96*b*	..	..
600,000	,,	Mar. 21	7	7	Do. 7 p.c. Red. Pref.	102—104*b*	—2	..
165,756	,,	Feb. 21	9	8	Maidstone 5 p.c. Cap. . .	124—129	..	..
63,480	,,	June 27	3	3	Do. 3 p.c. Deb. . .	53—56	..	..
75,000	5	June 13	‡8	‡10	Malta & Mediterranean .	5½—6	..	..
392,000	—	Apl. 2	—	5½	Metrop't'n (of Melbourne) 5½ p.c. Red. Deb. . . .	100—102	..	..
841,920	Stk.	May 30	‡5	‡9	Montevideo, Ltd. . . .	105—108	..	..
2,051,318	,,	July 25	5	5⅓	Newcastle & Gateshead Con.	16/6—17/-*d*/	—-/6	..
682,856	,,	,,	4	4	Do. 4 p.c. Pref. .	70½—71½*d*	—2	..
891,705	,,	June 27	9½	9½	Do. 9½ p.c. Deb. .	68—69*d*	..	..
181,780	,,	Mar. 7	7/1/0	7/1/0	North Middlesex 5 p.c. Con.	105—110	..	..
900,000	,,	Apl. 24	9	7	Oriental, Ltd.	115—120	..	..
205,162	,,	June 27	8	8	Plym'th & Ston'house 5 p.c.	110—113	..	..
424,416	,,	Feb. 21	7½	8½	Portsm'th Con. Stk. 4p.c. Std.	113—118	..	..
241,446	,,	,,	5	5	Do. 5 p.c. max.	82—85	..	..
2,334,464	1	June 27	—	‡5	Primitiva Ord.	31/6—36/6	—-/6	34/—36/-
244,500	100	June 8	4	4	Do. 4 p.c. Red. Deb. . .	92—95	..	..
695,000	Stk.	July 25	4	4	Do. 4 p.c. Red. Deb. 1911	79—82*	+1	81½—82
416,345	,,	June 27	4	4	Do. 4 p.c. Cons. Deb. . .	79—82	+1	81—82
150,000	10	Mar. 21	6	8	San Paulo 6 p.c. Pref. . .	8½—9	..	..
1,736,968	Stk.	Mar. 21	6½	6⅔	Sheffield Cons.	108—110*e*	..	..
95,000	,,	Jan. 10	4	4	Do. 4 p.c. Deb. . . .	74—77*e*	..	..
90,000	10	June 13	‡4	‡4	South African	4—6	..	..
6,609,895	Stk.	July 26	7½	5	South Met. Ord.	102—104*	..	102½—102⅞
500,000	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	106—107*	..	..
1,895,445	,,	July 11	8	8	Do. 8 p.c. Deb. . .	57—60*	..	58½
734,000	,,	Mar. 7	6½	6½	Do. 6½ p.c. Red. Db.	100—102	..	..
91,500	,,	Mar. 7	8½	8½	South Shields Con. . . .	106½—107½*d*	..	..
1,543,795	,,	July 25	6½	6½	South Suburban Ord. 5 p.c.	103—106*	..	103½
468,887	,,	June 27	5	5	Do. 5 p.c. Deb.	95—98	..	96
647,740	,,	Mar. 7	5	5	South'mpton Ord. 5 p.c. max.	77—80	..	..
191,275	,,	June 27	4	4	Do. 4 p.c. Deb.	70—73	..	..
179,014	,,	July 25	8	8	Sutton Ord.	113—116*	..	..
350,000	,,	Feb. 21	7	7	Swansea 7 p.c. Red. Pref. .	100—102	..	..
300,000	,,	June 27	6½	6½	Do. 6½ p.c. Red. Deb.	100—102	..	..
1,002,275	,,	Mar. 7	—	6⅔	Tottenham District Ord. .	106—109	..	107½
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref.	97—100	..	..
151,255	,,	June 13	4	4	Do. 4 p.c. Deb.	74—77	..	..
259,094	,,	Mar. 7	6⅔	7	Uxbridge, Maidenhead, & Wycombe 5 p.c. . . .	93—98	..	..
88,390	,,	,,	5	5	Do. 5 p.c. pref. .	88—93	..	91
80,000	,,	July 11	9	9	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c. .	144—147*	..	..
255,636	,,	,,	7½	7½	Do. B 5½ p.c. .	122—127*	..	..
432,585	,,	,,	6.75	6.75	Do. C and New	100—105*	..	..
352,000	,,	,,	7½	7½	Do. Wimbledon 5 p.c. .	112—117*	..	..
98,000	,,	,,	7.5	7½	Do. Epsom 5 p.c. . .	123—128*	..	..
300,000	,,	,,	5	5	Do. 5 p.c. Pref . . .	87—92*	..	92
88,416	,,	June 27	3	3	Do. 3 p.c. Deb. . . .	54—57	..	..
284,743	,,	,,	4	4	Do. 4 p.c. Deb. . . .	74—77	..	..
307,500	,,	,,	5	5	Do. 5 p.c. Deb. . . .	93—96	..	..

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of Stock. * Ex. div. † Paid free of income-tax. ‡ For year.

(This announcement is inserted gratuitously.)

PETER—WITH ONE EXCEPTION

With one exception Peter is an ordinary little fellow. Chubby, likeable, just five-and-a-half, full of life and fun and on occasions—be it admitted—of naughtiness.

Just now Peter's rather important, for this is his first term at school, and he's grappling with the intricacies of "A B C" and "Twice Two": difficult subjects to all men of five-and-a-half, but even more difficult in Peter's case because—bad luck—he's totally blind. That's his One Exception.

Peter learns reading, writing, and 'rithmetic through the medium of "Braille"—dull stuff compared with the coloured picture books of most five-and-a-halfs. However, he's a stout lad is Peter, and he's making great progress.

Would you like to know more about him? How, in spite of his "One Exception," he is being educated, and, when older, technically trained and usefully employed.

There is a long waiting list of "Peters" throughout the British Isles, for whom training and accommodation must be provided in the immediate future.

Will you help with a donation or annual subscription? Any sum, large or small, will be gratefully received.

Here's a suggestion. Your eyesight is worth 3d. a year to you. Send Peter and his handicapped pals 3d. for every year you've had it. Now, please, in case it slips your memory. Good idea!

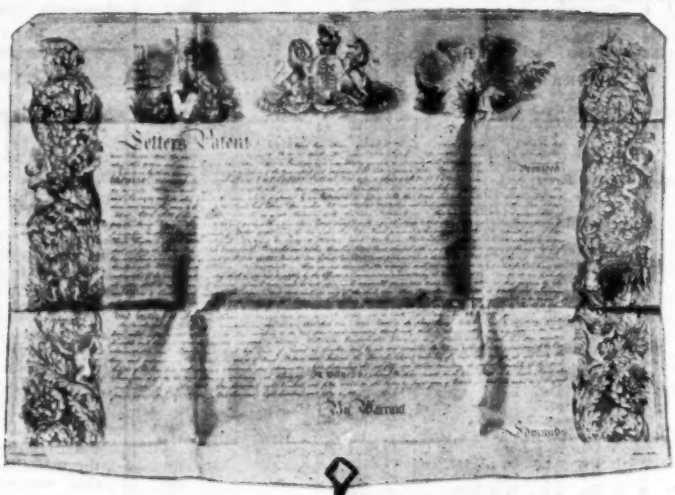
THE CHAIRMAN,

SCHOOL FOR THE BLIND

(Founded 1838),

Swiss Cottage, LONDON, N.W.3

A RECORD of PIONEERING WORK & PROGRESS in the GAS INDUSTRY



1855

Patent granted to William Cartwright Holmes, the Founder of the firm of W. C. Holmes and Company, Ltd.

1883 THE "BRUSH" WASHER first patented.

1895 THE "NEW" BRUSH WASHER introduced.

1899 "WESTERN" GAS VALVES first introduced.

1911 CONTINUOUS TAR DISTILLATION.

1914 SUPER TYPE, HORIZONTAL TUBE CONDENSERS.

1920 THE "1920" PATENT BRUSH WASHER.

1922 STAGE WASHING for COMPLETE NAPHTHALENE REMOVAL perfected.

1926 CONNERSVILLE POSITIVE "DRY" STATION METERS, Exhausters and Boosters introduced.

1927 THE "DRI-GAS" PROCESS for removal of water vapour before distribution.

W. C. HOLMES & CO., LTD.,
HUDDERSFIELD - ENGLAND.